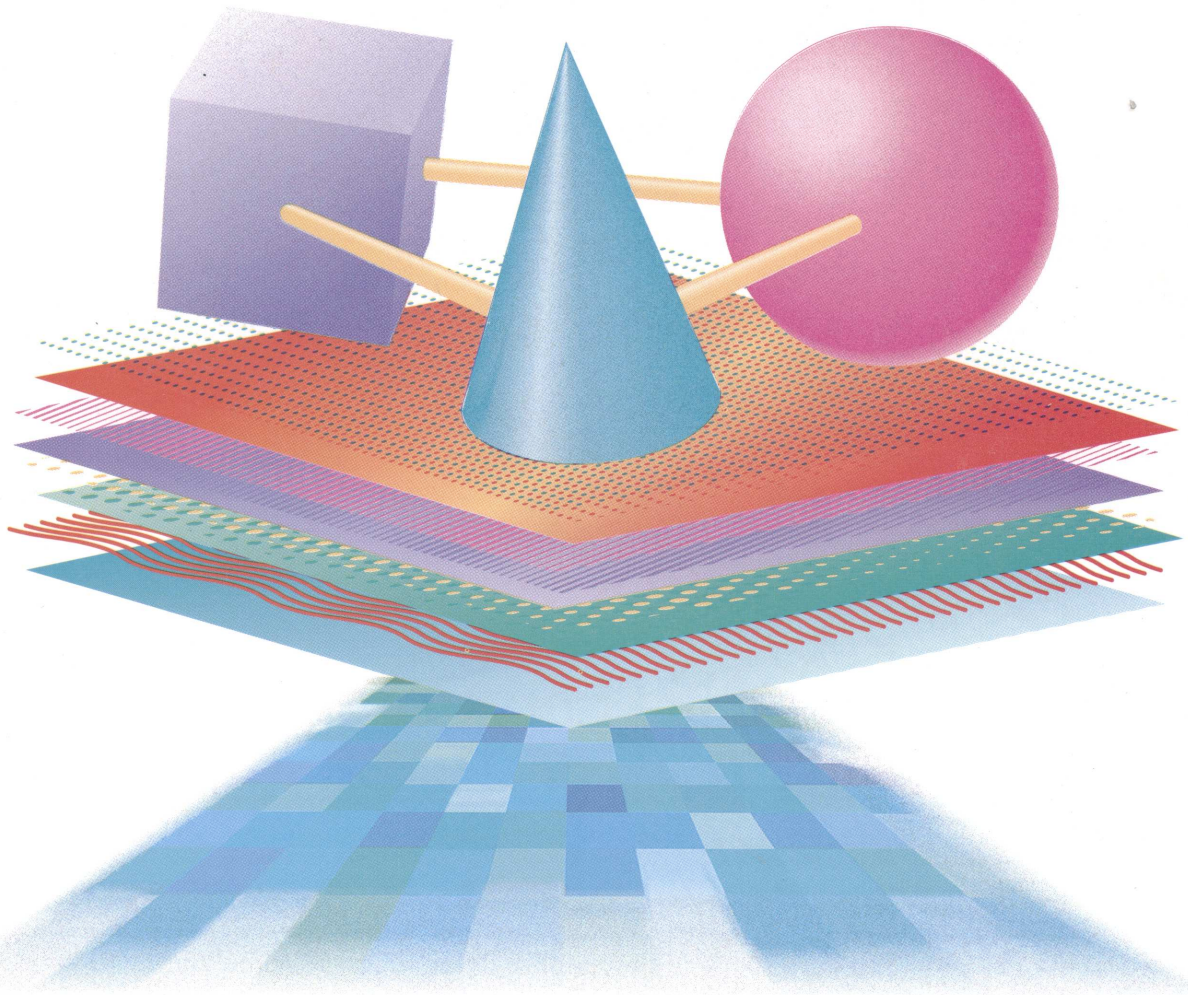
hp-ux/usr

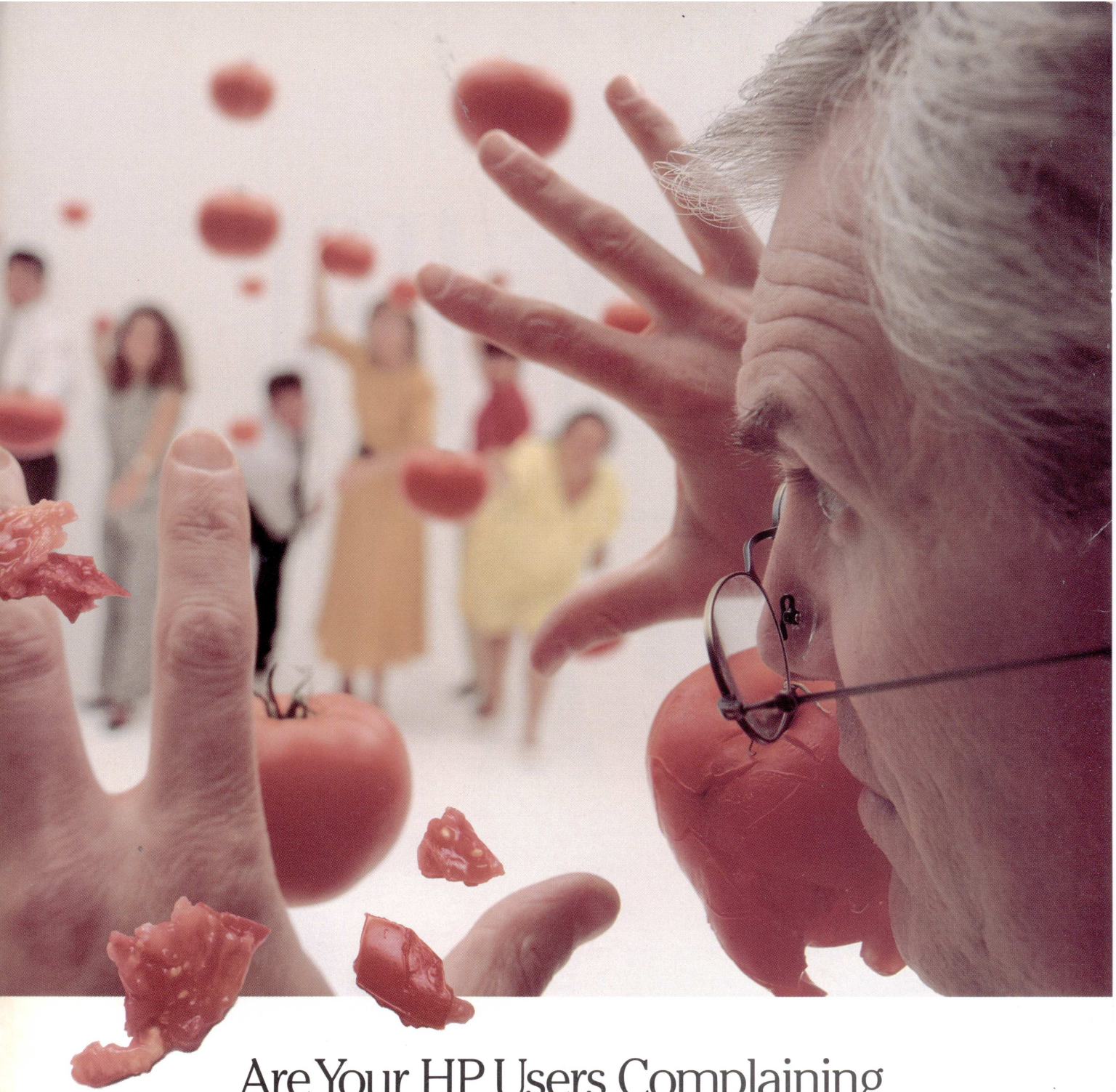
Hands-On Solutions for HP-UX Users • July 1993



Simple Network Management Protocol Packet Decoding

HP-UX Systems Management Solutions • Device and File System Swap

A Publication of INTEREX • The International Association of Hewlett-Packard Computer Users



Are Your HP Users Complaining About Missing Their PC-Based Applications?

Now, SoftPC® adds Microsoft Windows™ and MS-DOS® applications to your HP-UX® workstation environment. On one screen, your users can run PC-based and HP-UX applications side-by-side at up to 486 performance thanks to Insignia Solutions' proprietary mouse and Windows drivers.

Your HP workstation users can share files between HP-UX and PC environments on HP Series 9000® workstations. They can even enjoy SVGA, VGA, CGA, EGA and Hercules graphics. Microsoft Windows 3.1 and MS-DOS 5.0 are pre-installed so they can get right to work using their favorite PC-based personal productivity applications, legacy systems, or HP-UX programs. You can please all your users – call Insignia Solutions today: 1-508-682-7600.

Reseller/VAR program available.

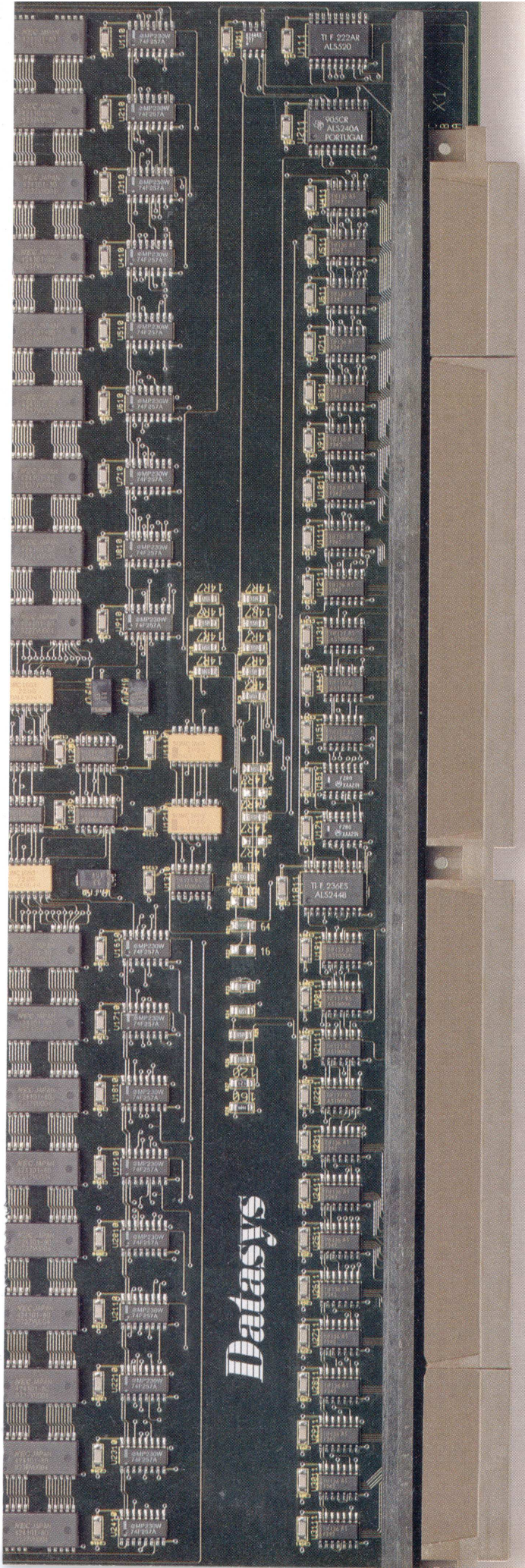
Insignia® Solutions
Bridging Worlds Of Software

Insignia Solutions Inc., 6 Campanelli Drive, Andover, MA 01810

Insignia Solutions, Ltd., Kingsmead Business Park, London Road, High Wycombe, Buckinghamshire HP11 1JU, UK. Fax +44 494-459720. Call +44 494-459426.

SoftPC is a registered trademark of Insignia Solutions. MS-DOS is a registered trademark and Microsoft Windows is a trademark of Microsoft Corporation. HP-UX and HP 9000 are registered trademarks of Hewlett Packard Corporation. All other trademarks or registered trademarks belong to their respective holders.

CIRCLE 36 ON READER CARD



We've discovered an affordable cure for amnesia.

Why suffer memory loss on your next upgrade? Instead of losing the memory you replace, let Datasys give you meg-for-meg trade-in credit on your existing memory when you upgrade to any Datasys memory product.

When you install Datasys memory during your next system upgrade, you're not only saving memory, you're saving money—30 to 50 percent less than HP's list price in most cases.

Datasys offers you a full-line of quality memory products for HP 3000 and HP 9000 systems, including memory products that support HP's 9xx, 8xx and Emerald platforms. Datasys memory is totally transparent to your system and is 100-percent compatible with HP's diagnostics for optimum performance.

And with a 256MB upgrade on HP's new Emerald system that lists for $192,000.00, the difference Datasys can make is dramatic.

Datasys memory is backed by a lifetime warranty and next-day replacement guarantee. Our boards are manufactured by EMC and GFK, the Hamburg, Germany memory manufacturer which has dominated the European market in HP-compatible memory products for the past 15 years.

Depend on Datasys quality. Our memory boards have never failed—not even once. By using Datasys memory you'll continue to receive your current level of support from HP. And should you ever need assistance, we provide complete technical support 24-hours-a-day, seven-days-a-week.

Best of all, Datasys memory is in stock and ready for immediate shipment.

Why suffer from system amnesia? Pay only for what you gain, not for what you get.

Call today and let Datasys cure your memory loss.

Memory you can forget about.
At a price you'll remember.™

Datasys

Call 1-800-DATASYS

CIRCLE 31 ON READER CARD

hp-ux/usr

Volume I, Number 3 July 1993

Contents



HP-UX Systems Management Solutions
See page 52

Features

Simple Network Management Protocol Packet Decoding	*by Steve Witten*	*16*
Book Review: UNIX Power Tools	*by Chris Curtin*	*48*
Device and File System Swap	*by Rebecca Coggins Propst*	*50*
HP-UX Systems Management Solutions	*by Craig Ledo*	*52*

Departments

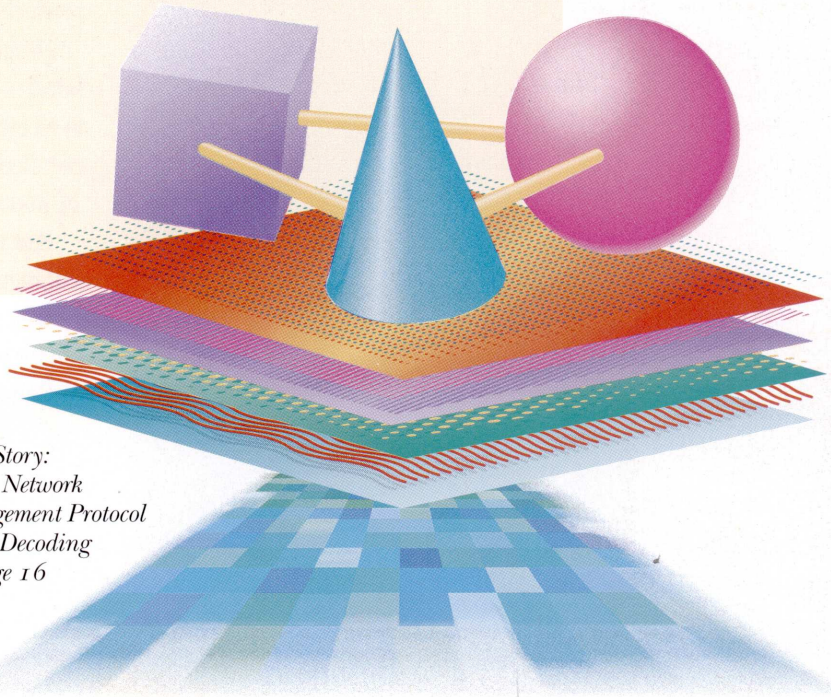
Q&A	*8*
CSL/HP-UX	*74*
HP-UX News	*76*
New Products	*78*

Columns

X-Watch	*by Larry Headlund*	*60*
HP-UX Systems Administration	*by Chris Curtin*	*65*
CD-ROM	*by Bill Hassell*	*68*

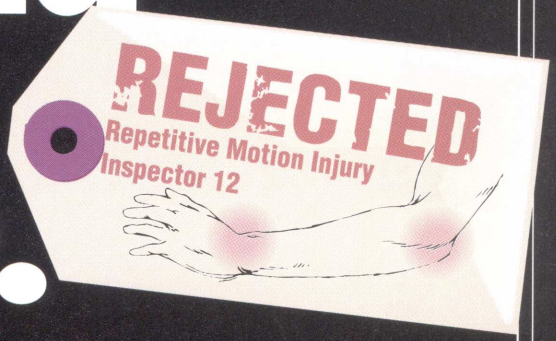
New Products
See page 78





Cover Story: Simple Network Management Protocol Packet Decoding
See page 16

Use a cheap mouse and you'll pay for it.



Fingertip, Not Elbow Control If you're using a mouse, you're asking for trouble. The motions required to operate a mouse have been shown to cause repetitive motion injuries. That's why we designed the MOUSE-TRAK® to eliminate wasteful and tiring arm and wrist movements. The fingertip control of our trackball and input keys, and our elevated hand support can reduce the risk of repetitive motion injuries. So don't get caught in the RMI trap (*Call our 800 number or contact us via Internet, and we'll send you a complete analysis of repetitive motion syndrome and why MOUSE-TRAK is superior to mice.)*

INDUSTRIAL MODELS	
HP/APOLLO	$295
SUN Sparc	$295
DEC	$295
Silicon Graphics	$295
NCD X-Terminal	$295
RS/6000	$295
PCserial	$295
PS/2	$295
Macintosh ADB	$295
PROFESSIONAL MODELS	
HP/APOLLO	$199
SUN Sparc	$199
DEC	$199
Silicon Graphics	$199
NCD X-Terminal	$179
RS/6000	$179
PCserial	$179
PS/2	$179
Macintosh ADB	$179

Our Materials Matter, Too We only use the best to build a MOUSE-TRAK. Hardened and polished stainless steel shafts, a polished phenolic ball, and steel ball bearings provide a lighter feel and a long lasting, trouble- free mechanism. Features that a commodity trackball can't give you.

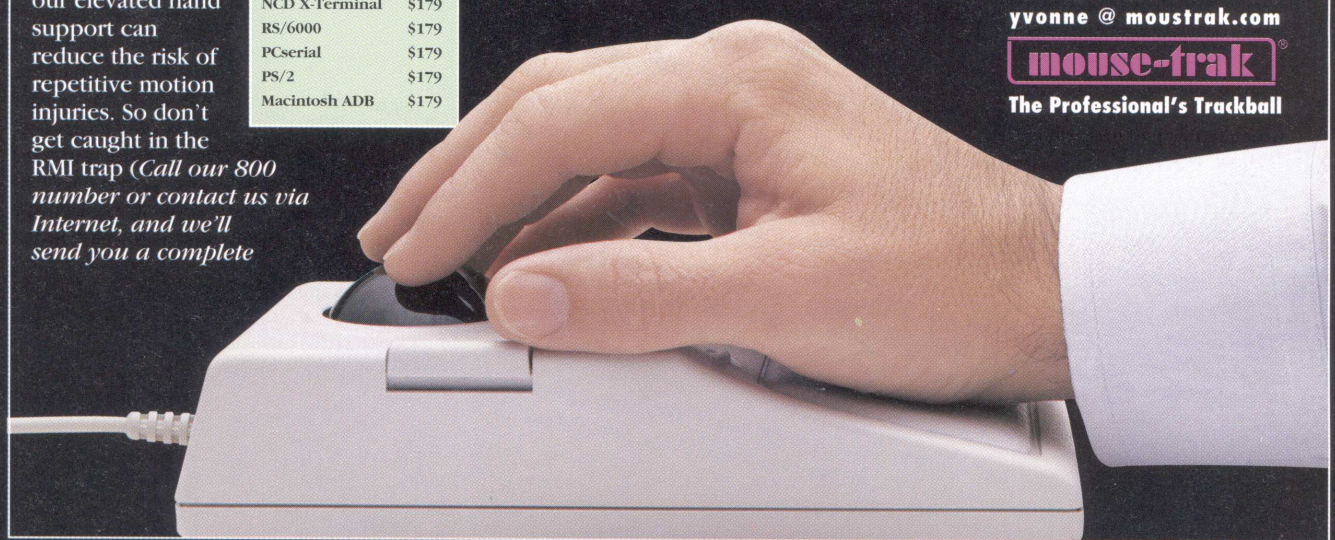
For All Major Platforms We offer models for all high performance workstations, PCs and Mac's, complete with interface cable, instructions and a one-year warranty.

Industrial Model Available Our *Industrial* model has the same ergonomic design as the *Professional,* with heavy-duty features like a super-strong Xenoy thermoplastic case, sealed ball opening, and greater moisture resistance.

Lose Your Mouse and Increase Productivity If you are a professional involved in CAD/CAE, Desktop Publishing, Command and Control, Drafting, or Business Graphics, you need the efficiency and durability of a MOUSE-TRAK. For the name of the Dealer/ Distributor nearest you, more information, or to order your MOUSE-TRAK direct, in the U.S.A. call:

1-800-533-4822
yvonne @ moustrak.com

mouse-trak®
The Professional's Trackball



ORDER TOLL FREE 1-800-533-4822

International MOUSE-TRAK dealers: **NTWare Ltd.** Pangbourne, Berkshire U.K. Tel: 0734 845792 • **Skrivervik Data** Oslo, Norway Tel: 47 2 18 58 00 • **The Chamelon Group** Dusseldorf 1, Germany Tel: 0211-379057 • **SC METRIC A/S** Skodsborgvej Naerum, Denmark Tel: 42 80 42 00 • **Guillevin** Mississauga, ONT Tel: 416 670 8433 • **Hypec Electronics** Ryde, Australia Tel: (02) 808 3666 • **SPECMA** Gothenburg, Sweden Tel: 031 89 16 00 • **Aurora Systems, Inc.** Seoul, Republic of Korea Tel: 718-4985 • **PHASELYS** Rosny Sous Bois, France Tel: 48.94.84.85 MOUSE-TRAK is manufactured in the U.S.A. by ITAC Systems, Inc., 3113 Benton Street, Garland, Texas 75042 Tel: 214/494-3073 Fax: 214/494-4159 Patented by ITAC Systems, Inc. MOUSE-TRAK is a registered trademark of ITAC Systems, Inc. Other brand and product names are trademarks of their respective holders.

CIRCLE 42 ON READER CARD

Just Released

Unison Tymlabs

To: HP-UX Users
Re: Workload Scheduling Product Announcement

June 15, 1993 — Unison-Tymlabs has announced the general release of Maestro for UNIX, its flagship networked systems management solution. After a successful beta test period at HP-UX sites in the U.K. and the U.S., Maestro for UNIX is handling production workloads on both continents.

Maestro can schedule jobs anywhere on the network according to customized business calendars, in addition to date, day of the week and time. Job initiation can be dependent on the successful completion of other jobs, on the existence of needed files on any node in the network, on user response to a prompt, or on the availability of hardware or data resources.

Maestro automates every step of network workload management:

- Controls all client systems on the network from a single management console
- Schedules and launches jobs
- Limits the number of jobs executing simultaneously
- Integrates jobs submitted with 'at' and 'batch' commands
- Enforces job dependencies and restrictions across systems and platforms
- Provides real-time job tracking displays
- Keeps a detailed record of job execution and provides a comprehensive audit trail
- Logs statistics for complete reporting and analysis
- Documents job completion status and automates recovery procedures
- Ensures job processing integrity through fault-tolerant workload distribution

Maestro runs both in pure UNIX environments and on mixed UNIX and MPE networks. In distributed environments, the host machine manages file and resource dependencies, system and schedule limits, and full inter-system job and schedule dependencies. The Maestro master console on the server provides a single interface for monitoring and control.

"After years of solving batch job management problems in demanding HP 3000 commercial environments, we're now offering an industrial-strength scheduler for HP-UX," commented Rory Roybal, director of Unison-Tymlabs' open systems product marketing. "Maestro has made it possible for HP 3000 shops to process as many as 4000 batch jobs per day. Now it can do the same on the HP 9000 Series 700 and 800."

Maestro for UNIX joins SpoolMate, KLA, and the Session connectivity tools in Unison-Tymlabs' line of system management products for commercial UNIX systems. For further information, call Unison-Tymlabs at (408) 245-3000.

Unison-Tymlabs • 675 Almanor Avenue • Sunnyvale, CA 94086 • (408) 245-3000

MAESTRO • NOW ON UNIX

CIRCLE 43 ON READER CARD

hp-ux/usr
A Publication of **Interex®**

INTEREX EXECUTIVE DIRECTOR
Charles A. Piercey

EDITORIAL

DIRECTOR OF COMMUNICATIONS
Richard A. Rasmusson
PUBLICATIONS MANAGER
Connie Wright
EDITOR
Michael Ehrhardt
COPY EDITOR
Richard Kranz
NEW PRODUCTS EDITOR
Michelle Pollace
TECHNICAL ADVISOR
R. Arthur Gentry
PROOFREADER
Jean Nattkemper

ADVERTISING & MARKETING

ADVERTISING MANAGER
Brian Hallin
ACCOUNT REPRESENTATIVE
Liana Fisher
MARKETING & COMMUNICATIONS MANAGER
Denise Garlow

DESIGN AND PRODUCTION

PRODUCTION MANAGER
Bruce Saltzman
SENIOR GRAPHICS DESIGNER
Molly McGinnity
GRAPHICS DESIGNER/ PRODUCTION COORDINATOR
Tami Bosworth
GRAPHICS DESIGNER
Gale Patterson
TYPOGRAPHER
June Ramirez

hp-ux/usr is published bimonthly by Interex, the International Association of Hewlett-Packard Computer Users. Third-class postage paid at Sunnyvale, California 94086 and additional offices. The editorial and business offices are located at 1192 Borregas Ave., Sunnyvale, California 94089, USA, (408) 747-0227, Fax (408) 747-0947. Address membership questions and change of address to Membership Services. Address all questions concerning circulation/distribution to the Distribution Manager.

Remittances should be sent to Interex, File No. 61054, P. O. Box 60000, San Francisco, California 94160, USA.

Address all editorial correspondence to Michael Ehrhardt, Editor, *hp-ux/usr* Magazine, c/o Interex, P.O. Box 3439, Sunnyvale, California 94088-3439, USA.

Member Services (Site or General) include a subscription to *hp-ux/usr*. For other Member Services refer to membership form.

Statements of fact and opinion are the responsibility of the authors alone and do not imply an opinion on the part of the Interex Board or Magazine. Entire contents copyright © 1993 by Interex. All rights reserved.

POSTMASTER: Send address changes to: Interex, P.O. Box 3439, Sunnyvale, California 94088-3439 USA. Attention: Member Services.

TRADEMARKS: UNIX, UNIX System Laboratories, Inc; HP-UX, Hewlett-Packard; X Window System, Massachusetts Institute of Technology

Bulk rate U.S. postage paid
Senatobia, MS . PERMIT # 30

How to Contact Interex...

EDITORIAL SUBMISSIONS

hp-ux/usr encourages readers to contribute their opinions, tips, and solutions. When sending letters for publication or to request author contribution guidelines, please address them to *hp-ux/usr* editor Michael Ehrhardt.

Postal Address:
Interex
P.O. Box 3439
Sunnyvale, CA 94088-3439

Office Address:
1192 Borregas Avenue
Sunnyvale, CA 94089

Because of the difference in zip codes between our office address and P.O. Box, please be sure to address all regular mail to the P.O. Box. Any express service packages should be delivered to the Borregas Avenue address. Thank you for your attention to this small but significant detail.

TELEPHONE:

The Interex switchboard is open 8:00 a.m.–5:30 p.m., Pacific Time. Call 800/468-3739 (U.S. and Canada) or 408/747-0947. After 5:30 p.m. our voicemail system will record your call.

FACSIMILE:

Call 408/747-0947

INTERNET:

To send e-mail to Interex, use the following address format:
<IDname>@interex.org
The following IDs are currently active on Interex's HP 9000:

ID	Department
ehrhardt	*hp-ux/*usr Letters to the Editor, Q&A, and requests for author guidelines
postmaster	Internet support
cslhpux	Contributed Software Library
membership	Membership inquiries and services
pubs	Circulation and advertising inquiries
conference	Conference questions and arrangements

An example would be Ehrhardt_Michael@interex.org
Anything before the @ sign is case insensitive.

COMPUSERVE:

Interex has a single account which is collected daily. Please address all messages to Denise Garlow, ID no. 76376, 1222.



Interex is information exchange at the most human level — User to User

As a not-for-profit association of HP computing professionals, Interex is dedicated to meeting the information, education, and advocacy needs of its members worldwide.

In today's rapidly changing high-tech world, Interex puts hands-on solutions to hardware, software, and operating system problems at your fingertips. Because members actively contribute—exchanging ideas and sharing solutions—Interex has become a vital link in the transfer of HP expertise.

Operating independently from Hewlett-Packard, Interex has more than 19 years of serving HP computing professionals. Through its publications, conferences, and volunteer committee structures, Interex has the qualifications to represent you, a valuable member of the HP user community.

Interex® is a trademark registered in the U.S. Patent and trademark office.

19th Annual HP User Conference and Expo

Interex '93

HP-UX AND WORKSTATION USERS

San Francisco, Moscone Center ▪ September 19-23, 1993

The Hands-on Conference for HP-UX and Workstation Users

User-to-user information exchange. The Interex '93 Conference & Expo offers you hands-on access to the tools and strategies vital to HP-UX and Workstation computing success.

Interex '93 will focus on critical issues for HP-UX and Workstation users:

- **Standards**—XOpen, UNIX International, OSF, and Dataquest representatives will offer expert perspectives.
- **Networking**—Learn how to evaluate, install, administer and manage both heterogeneous and standard networks.
- **Conversion**—Learn how to migrate from a mainframe environment to an HP-UX client-server environment.
- **Software Development Techniques**—Use configuration management, CASE, GUI Development, multi-media, object databases, and 4GL to solve their organizational needs.
- **Management and Administration**—Learn how people are using Open View and other techniques to manage and administer their HP-UX data centers and client-server environments.
- **Workstation Options**— Find out which one is appropriate for your environment.

CONFERENCE KEYNOTE SPEAKERS INCLUDE:

Lewis E. Platt: *President and CEO of Hewlett-Packard Co.*
Conference Keynote

Making Strategic Information Planning Work
Dr. James C. Wetherbe, Director of Management Information Systems Research Center, University of Minnesota

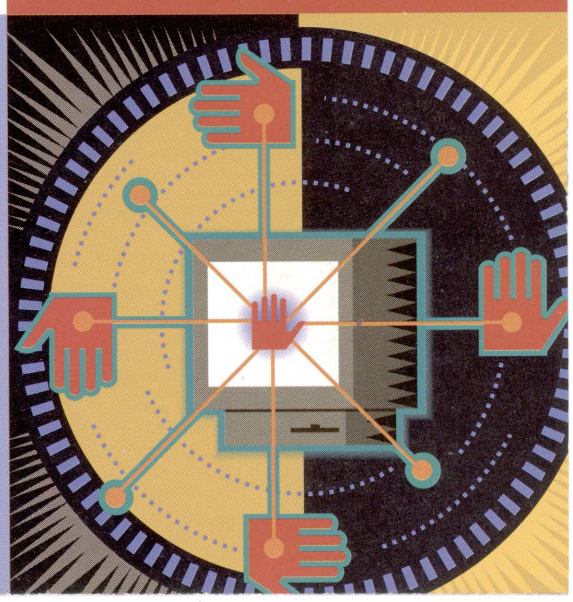
The Strategic Importance of Object Technology for the Software Industry
Christopher Stone, President & CEO, Object Management Group

Open Systems and Client-Server
Jeffrey Tash, President, Database Decisions

Our Largest Expo Ever!
Interex '93 is the largest and best third-party Hewlett-Packard Vendor exposition in the country—featuring more than 60 exhibitors with an HP-UX and workstation focus.

Who Should Attend:

- All HP-UX and workstation users
- MIS Professionals
- Technical Users
- Senior Analysts
- System Administrators
- Software Engineers
- Programmers



PHONE, FAX OR MAIL FOR MORE INFORMATION ON INTEREX '93 SIMPLY CALL 800-INTEREX, OR MAIL THIS COUPON TO:

Interex '93 Conference, P.O. Box 3439, Sunnyvale, CA 94088-3439, USA

☐ I want to register now! Please fax me a registration form immediately

Send me:

☐ The full conference program detailing all papers and tutorials
☐ A free exhibit pass—Plus admission to conference keynote sessions

Name _____ Title _____

Company _____

Address _____

City _____ State _____ Zip _____

Phone _____ Fax _____ E-Mail _____

or Fax a copy of the coupon to (408) 747-0947
Watch for conference updates posted on comp.sys.hp NEWSGROUP

SFADHP

New Optical Character Recognition (OCR) Module

Fax FX

THE UNIX® FACSIMILE SOFTWARE SYSTEM™

INTEGRATION • PERFORMANCE • SUPPORT

FaxFX™ is a high-performance, multi-user fax software system for UNIX-based computers. FaxFX enables an unlimited number of users to send, receive, view and print fax communications with the rest of the planet right from their ASCII terminals, PC's and workstations.

FaxFX is your solution if integration with other applications is mission-critical to your company.

Now Devcom introduces FaxFX OCR™–the only Optical Character Recognition module optimized to convert received faxes into ASCII text for word processing, E-mail or other applications!

FaxFX was designed by Devcom to integrate flexibly with your UNIX-based applications. It includes a powerful user interface, graphical tools and extensive documentation.

FaxFX is a proven performer in over 1,000 UNIX sites of all sizes.

Call us at 708/574-3600 or fax 708/572-0508 today for more information or to take FaxFX for a test drive.

RESOURCE REQUIREMENTS: IBM RS/6000, HP, Motorola, Unisys, Sun, Data General, Sequent, SCO, Interactive or other compatible UNIX platforms, 20 MB disk space, one or more tty lines, and one or more compatible fax modems (Practical Peripherals, MultiTech and others); optional FaxFX OCR currently compatible with IBM, HP and Sun.

Devcom
Mid-America, Inc.

2603 W. 22nd St., Suite 23
Oak Brook, Illinois 60521 USA
708/574-3600 • FAX 708/572-0508
E-Mail uunet!devcom!fax-info

IBM Business Partner
Managing Industry Remarketer

FaxFX, FaxFX OCR and "THE UNIX FACSIMILE SOFTWARE SYSTEM" are trademarks of Devcom Mid-America, Inc., all other trademarks belong to their respective owners. ©1993 Devcom Mid-America, Inc.

CIRCLE 34 ON READER CARD

The Apollo 11 Mission aboard a Saturn V, Cape Kennedy

MISSION-CRITICAL FAX PERFORMANCE!

Fax FX

THE UNIX FACSIMILE SOFTWARE SYSTEM™

INTEGRATION • PERFORMANCE • SUPPORT



Question & Answer

Q: How can I log the messages on the console?

A: There are many different ways to write to the console. One is the /etc/dmesg buffer, which contains many of the messages encountered during bootup plus many messages associated with drivers. Other messages can be written using the syslog(3C) call in a program. Finally, messages can be written directly to the console using the /dev/console device file. This is not a good idea since logging can be bypassed, but some programs do it.

/etc/dmesg reads a FIFO buffer that is about two pages long. Messages added at the bottom scroll information off the top of the screen. To log /etc/dmesg information into a file, /etc/dmesg has an option to "remember" what additions have been made recently.

The command `/etc/dmesg -` (just the minus character) will report all the differences between the first `/etc/dmesg -` command and subsequent runs of the same command. This may be appended to a file for logging and an example of this is provided in /etc/newconfig/crontab.root.

Here is an example to log messages using cron:

```
# log kernel diagnostic messages every 10 minutes
05,15,25,35,45,55 * * * * /etc/dmesg - >>/usr/adm/dmesg.log
```

To view the latest logged information, the `/bin/tail` command can be used as in:

```
/bin/tail /usr/adm/dmesg.log
```

This log file will now grow forever, so using the example in /etc/rc to trim logfiles, add these lines:

```
# Move /usr/adm/dmesg.log to OLDdmesg.log and zero current log
mv /usr/adm/dmesg.log /usr/adm/OLDdmesg.log
> /usr/adm/dmesg.log
```

A good location for this is in the clean_adm() routine in /etc/rc.

Q: Where did this message come from:

```
============================
Thu Nov 22 08:12:14 EST 1992
array monitor daemon
============================
drive error:
on array at address 6 select code 41
channel 3 ID 0 FAILED
```

A: This is a disk array diagnostic message; details on the various messages can be found in the *Disk Array Utilities Manual*, part number 5961-0714. Messages can be logged using /etc/dmesg - and cron. (See previous question.)

Q: After rebuilding my kernel, I am now getting the error message on bootup:

```
MOUNT: device busy (EBUSY) (errno==16)
bad magic
```

A: First, check the terminal settings on the console terminal. For most systems, the settings are not critical but are recommended to be:

9600 (baud) None/8 (parity) Xon/Xoff (Recv Pacing)

Try rebooting the system manually, that is, interrupt the ISL boot sequence, answer yes to boot from primary path and yes to interact with IPL (also known as ISL). The system will place in memory a copy of the Initial System Loader or ISL and stop with the ISL prompt.

At this point, check the autoboot file with the command:

```
listautofl
```

and you will see the hpux command used for booting the system. This command may have several parameters; however, the correct command for a normal boot into init state 2 is:

```
hpux disc#(#.#.#;#)/hp-ux
```

where disc# is disc1 for HP-IB disks, disc2 for fiberlink, and disc3 for SCSI disks. #.#.# is the boot path to be used; for CIO computers this may look like 8.0.0 to boot from the address 0 disk. For a Nova type CPU (i.e., Series 8x7) this might be 52.6, and so on. You will need to verify the hardware path. The third variable is ;#), where # is the section number of the disk where the root file system resides. The default value is ;13), but this is site-dependent.

If the boot string shows something like:

```
hpux -aS (8.0.0;13)/hp-ux
```

then a default bootstring has replaced the proper string and must be overlaid with the previous example: hpux disc#(#.#.#;#)/hp-ux using the LIF utilities. To verify that all is correct on the root disk, simply type the correct hpux boot string, but specify -is rather than -i2 so the the system comes up in single user mode.

If this works OK, do the following to replace the autoboot string:

```
vi /tmp/AUTO          (creates the new AUTO file)
```

(create and save a one-line file with the correct hpux string)

```
lifrm /dev/rdsk/c0d0s6:AUTO (removes the old AUTO
                             file from lif volume)
lifcp -K2 -T-12289 -r /tmp/AUTO /dev/rdsk/c0d0s6:AUTO
   (copies the new AUTO file back to the lif volume)
```

Reboot the system and the new AUTO file will be used for the auto boot.

Q: I'm using JetDirect and when I plug in my PostScript cartridge, the JetDirect interface stops working.

A: The reason is that many of the PostScript cartridges change the printer's port from OPTIONAL to PARALLEL. To fix this, take the printer offline, hold down the MENU key for six seconds, and then press the MENU key until the message I/O=PARALLEL shows up.

Press the + key until I/O=OPTIONAL shows up and then press ENTER to keep the config.

Q: I need to strip all blank lines from some data files.

A: There are two ways to remove blank lines:

1. Use the grep command:

```
grep -v "^$" file_name
```

or

```
source_of_data | grep -v "^$" | some_other_command
```

2. Use the rmnl and ssp together as in:.

```
source_of_data | ssp | rmnl | some_other_command
```

Unlike the first example using grep, rmnl and ssp do not accept options or filenames, so they are strictly filters for std_in to std_out.

Additional notes:

ssp is equivalent to the 4.2BSD `cat -s` command.

To remove all blank lines from a file except at the beginning of the file, use rmnl(1). To remove all blank lines from a file including the beginning of the file, use rmnl piped to ssp, or ssp piped to rmnl.

Q: After making a new kernel, reboot hangs forever. What's wrong?

A: A few early shipments of 9.0 systems for Series 800 computers had an early version of the loader. The symptom is:

On a 9000/8x7 9.0 Instant Ignition, systems running LVM may hang at boot time after the line:

```
815504 + 155648 + start 0xbc50
```

(numbers may be different). This will occur just after building a new kernel.

The problem arises when your kernel happens to be copied into the last meg of the file system after SAM or uxgen runs and you are using an old version of the hpux loader that doesn't see the last meg.

This has been fixed in later system shipments. However, a permanent fix can be performed by either reinstalling from install media, or booting the system into LVM maintenance mode (ie, hpux -lm) and performing the following command at the prompt:

```
$ mkboot -p LABEL -p AUTO -i IOMAP -i RDB /dev/rdsk/c0d0s2
```

This replaces the incorrect loader stored on the disk by the Instant Ignition process.

Q: How can I read everything back from my JetDirect card?

A: There are two programs that report information on JetDirect TCP/IP cards: /usr/lib/hpnpadmin and /usr/lib/hpnpstat. Here are the options for each program:

usage: `hpnpadmin [ -abdDkloOprs ] [-c community] peripheral`

<none>	- show the peripheral status
-a	- check that this host is on the access list
-b	- show the bootup information
-c	- specify the SNMP community name
-d	- dump the SNMP PDUs
-D	- dump the memory image
-k	- kill the active TCP connection
-l	- show the peripheral location and contact
-o	- show operational statistics
-O	- show detailed operational statistics
-p	- show protocol statistics
-r	- reconfigure the interface
-s	- show the peripheral status

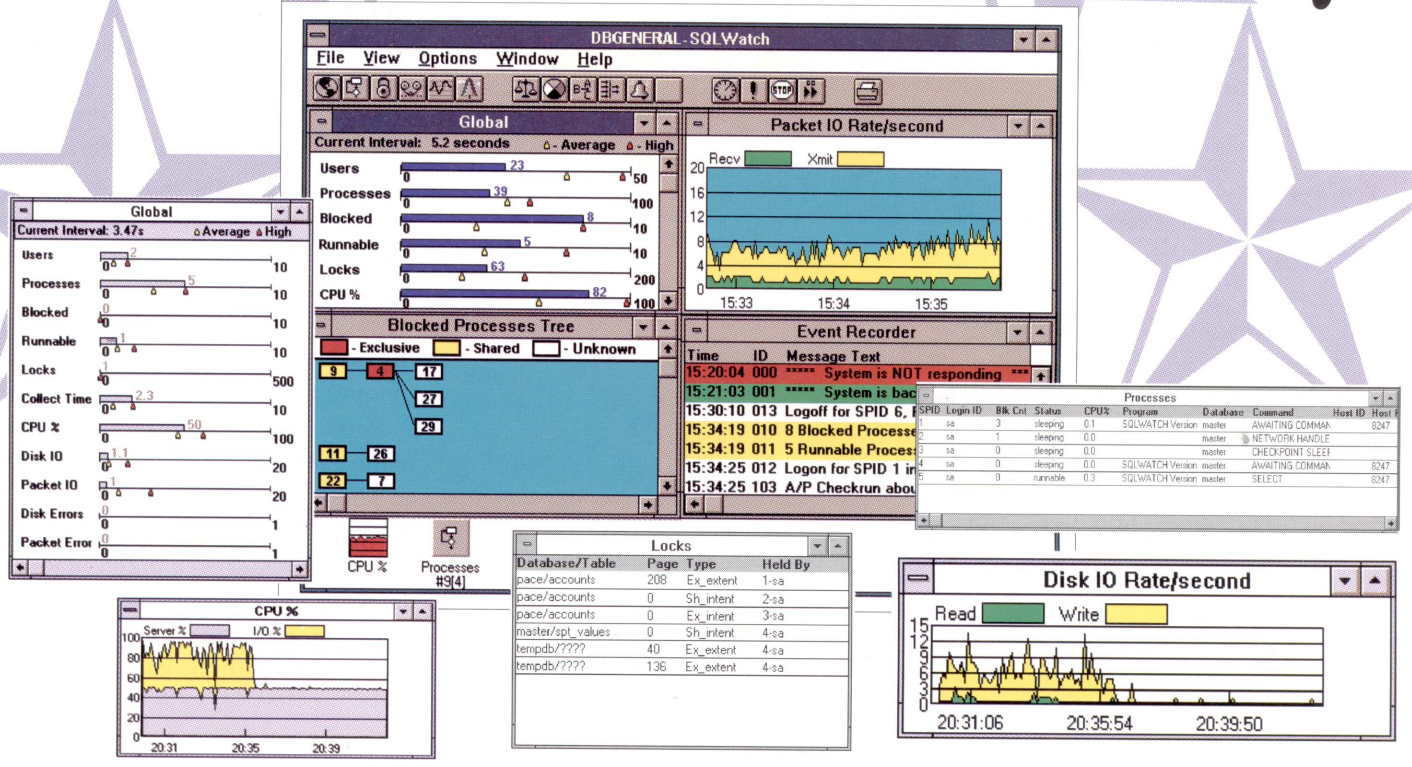
usage: `hpnpstat [-aAeiIlnNrSu] [-c community] peripheral`

<none>	- print out TCP table
-a	- print out TCP and UDP table combined
-A	- print out arp cache
-c	- specify the SNMP community name
-e	- print out ethernet statistics
-i	- print out interface table
-I	- print out IP address table
-l	- print long format if applicable
-n	- print addresses in numerical format
-N	- print names with no truncation
-r	- print out routing table
-S	- print out TCP and UDP Services table
-u	- print out UDP listener table
-d	- dump PDU to standard out

However, the options cannot be concatenated together for a complete report (e.g., `hpnpstat -aAce or hpnpadmin -a -b -c -d`). To get a complete picture of all the JetDirect parameters, use the following script:

```
#!/bin/sh JetDirect TCP-IP debug script
#
# Use to report all status info from a
# JetDirect peripheral
#
#
# USAGE:
#
```

Have you seen DBGENERAL lately!



SQL Server performance data never looked so good!

Introducing DBGENERAL's SQLWatch™ available for SYBASE, the first product to bring mainframe database performance monitoring to the Client-Server environment. SQLWatch gives you power-packed features:

Easy-to-understand graphs and lists. Stop struggling with text screens (sp_monitor, sp_who and sp_lock), and monitor critical SQL Server resources from one screen - and **in real time**. Since SQLWatch runs under Windows™ 3.0 (or above), you can monitor your SQL Server right from your desktop.

Analysis tools. Along with a better presentation of SQL Server statistics, you get the tools you need to analyze concurrency problems, like our Blocked Processes Tree, and the ability to sort and filter process data in practically every way possible.

The Event Recorder. This feature continually monitors the status of your SQL Server (in background, if you prefer) and records user-defined events.

Additional features, like the eight Animated Graphs, the user-configurable display options, and many others too numerous to describe here.

Call today to get your **FREE** 30-day evalution kit. It includes a functional copy of our Single Server/Single Client software and SQLWatch documentation.

HEWLETT PACKARD
Channel Partner

Put SQLWatch to work for you today. Because what you can't see *can* hurt you.

1-800-ASK-BRAD

BRADMARK
Technologies, Inc.

CIRCLE 30 ON READER CARD

SQLWatch is a trademark of PACE Systems, Inc. Other product names used herein have been used for identification purposes only, and may be trademarks of their respective companies.

```
# jetstat.all IP_address  or  printer's_net_name
#
if [ $# -eq 0 ]
   then echo "jetstat: needs network_name of
   printer or IP address"
   exit
fi
PrnID=$1
Stars="************************************************************" #
# Is it alive?
#
if `ping $PrnID -n 1 > /dev/null`
   then
   echo "Printer $PrnID responded to ping OK"
   for AdminID in s a b l 0 p
   do
      echo "$Stars"
      echo "hpnpadmin -$AdminID $PrnID:"
      /usr/bin/hpnpadmin -$AdminID $PrnID
   done
   for StatID in a A e i I l n N r S u
   do
      echo "$Stars"
      echo "$Stars"
      echo "hpnpstat -$StatID $PrnID:"
      /usr/bin/hpnpstat -$StatID $PrnID
      done
else
   echo $PrnID: Is not responding to ping. nslookup of $PrnID shows:
   echo
   nslookup $PrnID
fi
```

The output of the script will show all the information needed to look at the card and software for support purposes. This script can be stored in the /usr/lib/hpnp directory.

Q: Why does fbackup take so long to start when using blank tapes?

A: fbackup tries to prevent inadvertant erasure of previous backups and does so by reading the first record on the tape, looking for an fbackup header. If the data record is not in fbackup format, then the backup program proceeds normally. If the header is actually from fbackup, the program will ask for confirmation to overwrite.

However, fbackup does not control the tape. It simply asks for a data record and it is up to the driver to provide this. The driver starts the magtape reading and for a blank or erased tape, there will be no data to read. However, the driver does not know this and the tape drive continues to turn, looking for data. On a magtape drive such as the 7980 and similar 1/2-inch magtapes, the driver does not time out so the tape continues to the end of the reel, approximately five minutes later.

At this point, the tape drive completes the I/O request with an EOT status (end of tape) and fbackup continues. Since fbackup does not control the behavior of the driver, this time delay is inevitable.

The workaround is simply to `cat` a small file directly to the tape just prior to using fbackup on a brand new tape. This dummy file will cause fbackup's read request to be completed quickly and proceed with the backup.

Q: How can I see invisible characters in a file name?

A: Ocasionally, a file name may be created with a program or a command that does not check for non-displayable characters. There are many techniques to make these characters visible:

- Use the `ls` or `ll` command with `-b` as in: `ls -b`
- Perform the `ls` or `ll` command on an HP terminal with the DISPLAY FUNCTIONS option turned on.
- Pipe the `ls` or `ll` command into the `vis` command as in: `ls | vis`

Bill Hassell is an HP-UX system support engineer at the HP Atlanta Response Center. He can be contacted at his e-mail address which is blh@hpuerca.atl.hp.com.

Q: How do I order BPLUS software for BASIC/UX Revision 6.3 ?

A: The product number for BPLUS that runs on BASIC/UX Revision 6.2 and BASIC/UX Revision 6.3 is the same: E2160A.

However, the tape will contain two file sets instead of one. One is for BASIC/UX Revision 6.2 and the other is for BASIC/UX Revision 6.3.

You may select only the one that is appropriate for the BASIC/UX revision that is currently running on your workstation.

Q: How can the title for a BASIC/UX window be changed from the default title of "HP BASIC/UX:600"?

A: To modify the BASIC/UX window title you can use the `-title` option when running rmb. For example, the command:

```
rmb -title NEW TITLE
```

will change the title on the window to "NEW TITLE:600". The window number for the main BASIC/UX window will always be 600.

Q: Can I hook up an HP-IB printer to the model E2070A HP-IB interface in my 730? It is currently configured with two different instruments.

A: No. The HP 9000 Device I/O Library (DIL) is not fully implemented on the Series 700. In particular HP-IB support is limited to simple I/O for printers and plotters, and only via the 25560A EISA interface. A Portable I/O Library (PIL) is available as part of HP VEE-test (E2111A), but it supports only the E2070A ISA HP-IB and does not presently support the 25560A EISA interface.

Q: I am unable to run the audio demo program on HP 9000 Series 700 Model 750. Is it supported?

A: The audio software package contains client and server components, which can run on separate systems. Audio data can reside on still a third system. In all cases, however, the server must run on a Series 700 system equipped with audio hardware.

Audio hardware is built into Series 705, 710 and 715 computers and is included in the upgrades from:

720 to 725
730 to 735
750 to 755

Note that 705s may not have audio software. In addition, 720s, 730s, and 750s without the upgrade do not have audio hardware even though they have a jack labeled "audio."

Q: How do you start SRM/UX daemon automatically at HP-UX 8.0 on a stand-alone (non-diskless) SRM/UX server ?

A: To convince HP-UX 8.0 to start rbootd automatically on a stand-alone (non-diskless) SRM/UX server, you need to do a couple of things, both in the file /etc/rc:

As superuser, vi /etc/rc and look for this text near the end of the file:

```
standalone)   # Not a member of a diskless cluster
     echo "Starting up standalone system"
     set_privgrp
     set_date
     save_core
     swap_start
     syncer_start
     lp_start
     clean_ex
     clean_uucp
     net_start
     cron_start
     pty_start
     vt_start
     list_tmps
     clean_adm
     diag_start
     syslogd_start   # must be invoked after net_start
                       audit_start
     ;;
```

Insert text into it so the middle part looks like this:

```
clean_ex
clean_uucp
net_start
rbootd_start        # added for SRM/UX
cron_start
pty_start
```

ATTENTION NOVELL USERS

MS 92

Only one HP terminal emulator combines ODI compliance with Telnet and NS virtual terminal connectivity for Windows and DOS environments, MiniSoft 92 offering one package for one price, $159.00.

MINISOFT

13617 State Highway 9
Snohomish WA 98290
800/682-0200

CIRCLE 38 ON READER CARD

If you also wanted to start srmd automatically at boot, you could make it look like this:

```
clean_ex
clean_uucp
net_start
/etc/srmd           # added for SRM/UX
rbootd_start        # added for SRM/UX
cron_start
pty_start
```

Where you insert these lines matters. DO IT THE WAY YOU SEE HERE.

Next, find the function definition for `rbootd_start()`, and insert lines near the end so that part looks like this:

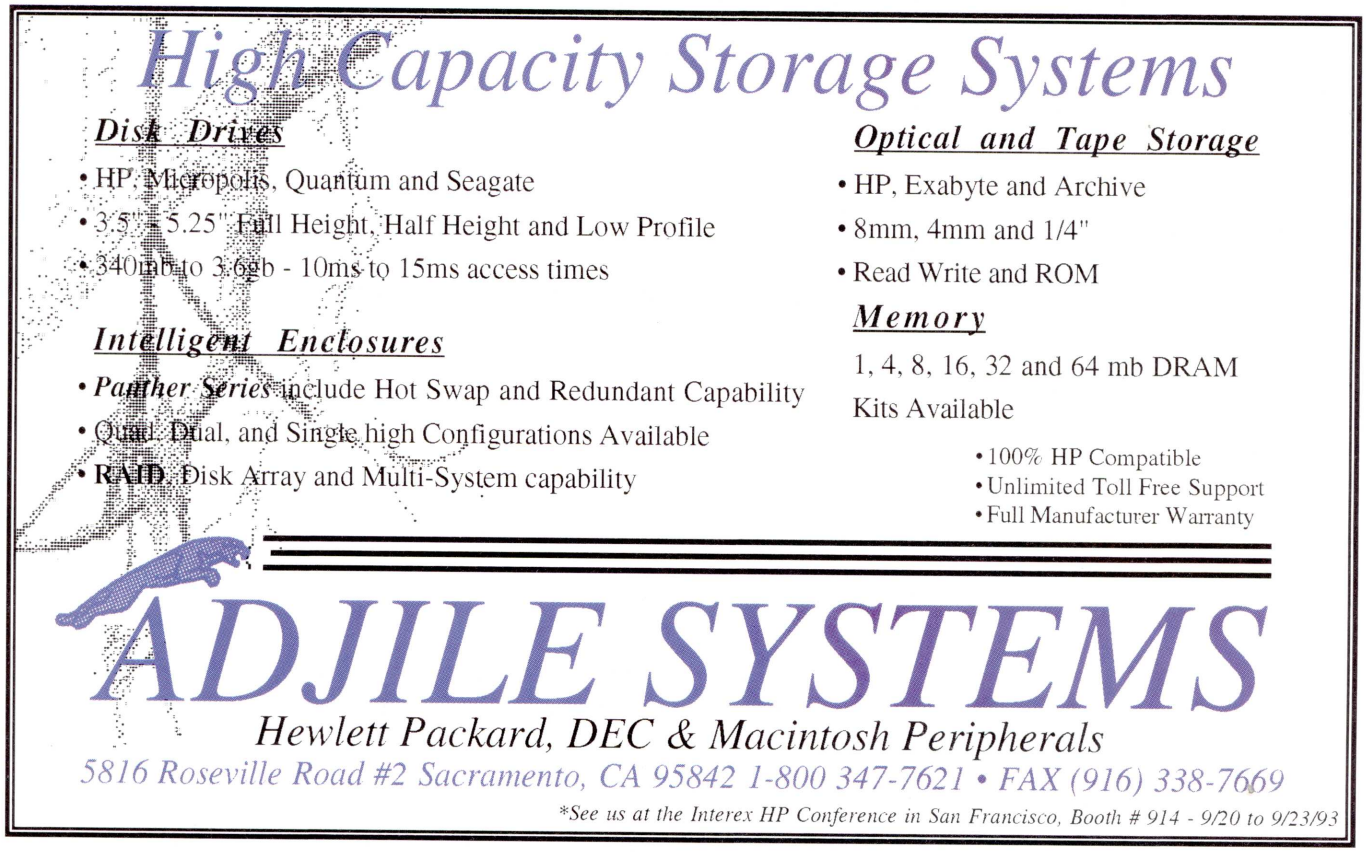
```
  remoteroot)
     ncsps=`/usr/bin/awk -F: '$3 == name && $1 !~ /#/ \
        { i = $NF+0; print i }' name=$SYSTEM_NAME /etc/clusterconf`
     set --`cnodes -l -m`
     if [ "`cnodes -m`" = "$3" -a "$ncsps" -gt 0 ]; then
        if /usr/bin/rtprio 64 /etc/rbootd; then
           echo "remote boot daemon started"
        else
           echo "Could not start remote boot daemon"
        fi
     fi
   ;;
   esac
 else
    if [ -x /etc/rbootd -a $state = standalone ] ; then
     if /usr/bin/rtprio 64 /etc/rbootd $RBOOTD_DEVICES; then
           echo "remote boot daemon started"
        else
           echo "Could not start remote boot daemon"
        fi
     fi
  fi
}
```

(The new stuff is just after the esac, starting with else)

Now reboot and you should be OK.

Q: What are the instructions for creating an RMB icon in BASIC/UX Revision 6.3 ?

A: When iconified, BASIC/UX now provides an icon for the window manager



CIRCLE 12 ON READER CARD

to display. You can choose from three icon sizes by specifying the proper bitmap file name as the window manager's "iconImage" X resource, either in your .Xdefaults file or by loading it into the resource manager database (using xrdb), e.g.,

```
Vuewm*rmb.iconImage:  bitmap_path_name
```

and for mwm, do:

```
Mwm*rmb.iconImage:   bitmap_path_name
```

where "bitmap_path_name" is the full path name to the bitmap file. The bitmap files Rmb.s.bm, Rmb.m.bm, and Rmb.l.bm are automatically copied to the /usr/lib/X11/bitmaps directory when you install BASIC/UX.

HP VUE 3.0 users can further customize BASIC/UX for that environment by adding an RMB control to the Front Panel, which consists of the RMB icon and the two actions: START_RMB and RUN_RMB.

This is accomplished by the following commands:

```
cp /etc/newconfig/rmb/sys.vuewmrc $HOME/.vue/vuewmrc
cp /etc/newconfig/rmb/START_RMB.vf $HOME/.vue/types
cp /etc/newconfig/rmb/RUN_RMB.vf $HOME/.vue/types
cp /etc/newconfig/rmb/START_RMB $HOME/.vue/types/tools
cp /etc/newconfig/rmb/RUN_RMB $HOME/.vue/types/tools
```

Please note that the last two files copied are empty; however, they are necessary for the RMB icons to appear in your Personal Toolbox. After executing the commands above, you can move the mouse to the RMB icon in the Front Panel, and click once to start BASIC/UX. Or, you may open your Personal Toolbox, where you can drop a PROG or SAVEd file on the RUN_RMB icon to execute it, or just double click on START_RMB to start BASIC/UX (also runs AUTOST, if it is found). ◧

Kaushik Mehta of the Hewlett-Packard Response Center in Atlanta, Georgia, answers workstation questions.

*S*imple *N*etwork *M*anagement

In 1988, the *Internet Engineering Task Force* (known hereafter as the **IETF**) developed the *Simple Network Management Protocol* (**SNMP**) to solve the problems associated with managing complex internetworks. SNMP evolved from the *Simple Gateway Management Protocol* in August of 1988 when Dr. Jeff Case, James (Chuck) Davin, Mark Fedor, and Martin Schoffstall formalized the protocol specification in RFC 1098. Marshall Rose and Keith McCloghrie contributed the specifications for the other two components of SNMP—the *Structure of Management Information* (RFC 1065) and the *Management Information Base* (RFC 1066). In April of 1989, SNMP became an Internet Recommended Standard.

Continued

S T E V E W I T T E N

Protocol Packet Decoding

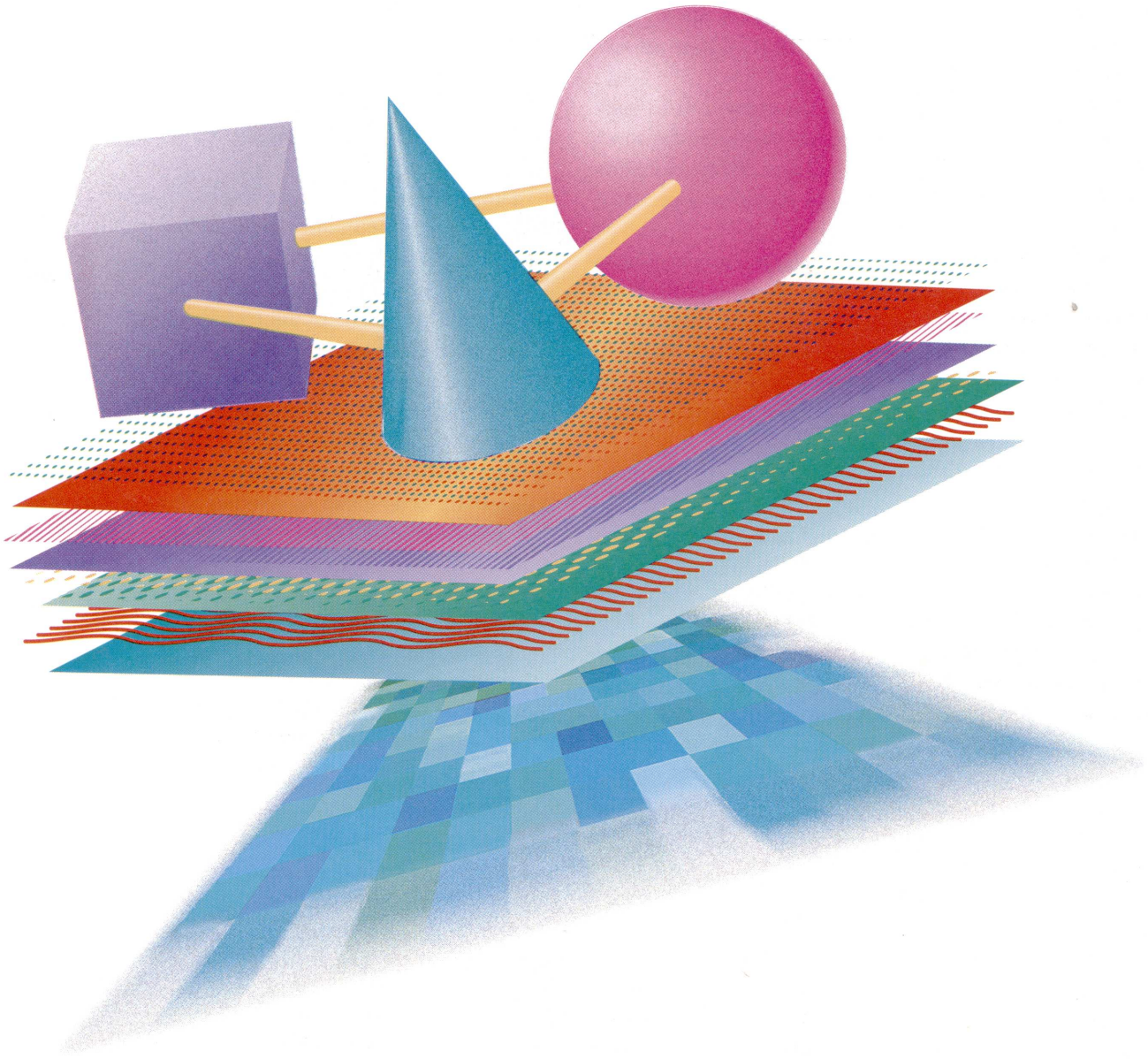


ILLUSTRATION BY NEA BISEK

During 1989, SNMP's appeal broadened rapidly beyond the Internet community—attracting waves of users searching for a proven, available method for managing multi-vendor networks. SNMP had its second release in May of 1990 with the release of RFCs 1157 (SNMP protocol specification), 1156 (the Structure of Management Information), and 1158 (Management Information Base-II or MIB-II). These are the current specifications for SNMP.

SNMP's monitoring and control transactions are actually independent of TCP/IP—requiring only datagram transport (UDP in the TCP/IP suite) to be operational. SNMP can therefore be implemented over any network medium or protocol suite—including OSI.

The SNMP architecture depends heavily on communication between one or a small number of *managers* and a large number of remote *agents* scattered throughout the network. An agent uses its particular *Management Information Base* (MIB) to provide a view of the local data available for manipulation by a manager. Any measurement or data to be reported to a manager must be represented as a MIB object.

The management station sends *get* and *set* requests to remote agents and agents initiate *traps* to the management station when an unexpected event occurs. Most of the burden for retrieving and analyzing data is placed on the manager. This was a conscious decision by SNMP's designers—that being a manageable element in a network was of secondary importance. The network element has a primary job to do (routing, etc.). Therefore, SNMP favors the simplicity of the agent and places most of the burdens of management tasks on managers.

Components of SNMP

SNMP consists of three components:

- the protocol itself
- the *Structure of Management Information* (SMI)
- the *Management Information Base* (MIB)

The MIB is a virtual database of managed objects that are accessible to the agent and are manipulated by the agent on behalf of managers in response to SNMP protocol message exchanges. The cooperation of the manager and the agent accomplishes the function of network management using SNMP. Each object is given a unique name and identifier for management purposes. The complete definition of a managed object includes its naming, syntax, definitions, description, and access rights (inaccessible, read-only, or read-write).

The SNMP protocol supports three basic operations on MIB objects:

- *GetRequest*, *GetNextRequest*, and *GetResponse* to query the value of MIB objects
- *SetRequest* (which is followed by a *GetResponse*) to change the values of MIB objects
- *Trap* to provide unreliable, asynchronous notification to managers of exceptional conditions

These operations are packaged in protocol data units (PDUs) that also contain trivial authentication information called the community name.

The SMI is the set of rules used to define variables (or objects) in the Management Information Base. The SMI includes generic data types used to describe management information (Integer, Counter, Gauge, etc.).

The SNMP SMI uses a subset of ISO's Abstract Syntax Notation One. SNMP's designers chose this approach in order to align the protocol with the OSI environment. The SMI organizes MIB objects into an inverted hierarchy for naming purposes. This structure is reminiscent of the UNIX file system. MIB object identifiers are formed using the same mechanisms as UNIX pathnames. One key difference, however, is that the SMI specifies that all MIB objects are known by their absolute identifiers. There is no concept of "relative" identifiers.

Abstract Syntax Notation One (ASN.1)

The three components of SNMP (the protocol, the Structure of Management Information, and the Management Information Base) are formally defined using an abstract syntax. This abstract syntax allowed SNMP's authors to define data and data structures without the usual problems of differences in machine representations. This abstract syntax is an OSI language called *Abstract Syntax Notation One* (ASN.1). ASN.1 is used for two distinct purposes:

- to define the formats of the packets exchanged by the agent and manager in the SNMP protocol; and
- to define the objects managed.

ASN.1 is a formal language. It is defined in terms of a grammar. The language itself is defined in ISO [6]. The management framework defined by the SNMP protocol, the SMI, and

the MIB uses only a subset of the capabilities of ASN.1. While the general principles of abstract syntax are good, many of the "bells and whistles" lead to unnecessary complexity. This minimalist approach is taken in order to facilitate the simplicity of agents.

ASN.1 Basic Encoding Rules (BER)

Once data structures can be described in a machine-independent fashion, there must be some way of transmitting those structures over the network in an unambiguous way. This is the job of the *transfer syntax notation*. Obviously, one could have several transfer syntax notations for an abstract syntax but only a single abstract syntax/transfer syntax pair has been defined in OSI. The Basic Encoding Rules (BER) embody the transfer syntax. The BER is simply a recursive algorithm that can produce a compact octet encoding for any ASN.1 value.

Structure of an Encoding

At the top level, the BER describes how to encode a single ASN.1 type. This may be a simple type such as an `INTEGER` or an arbitrarily complex type. The key to applying the BER is to understand that the most complex ASN.1 type is nothing more than a number of simpler ASN.1 types. Continuing the decomposition, an ASN.1 simple type such as an `INTEGER` is encoded.

Using the BER, each ASN.1 type is encoded as three fields:

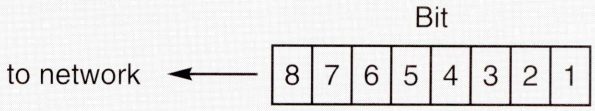
- a *tag field*, which indicates the ASN.1 type
- a *length field*, which indicates the size of the ASN.1 value encoding that follows
- a *value field*, which is the ASN.1 value encoding

Each of these fields is of variable length. Because ASN.1 may be used to define arbitrarily complex types, the BER must be able to support arbitrarily complex encodings.

It is important to note how the BER views an octet. Each octet consists of 8 bits. The BER numbers the high-order bit (most significant bit) as bit 8 and the low-order (least significant) bit as bit 1. See Figure 1.

It is important that this view be consistently applied because different machine architectures use different ordering rules.

FIGURE 1 *BER View of an Octet*



A large number of fields encoded by the BER are integer values expressed as binary numbers. Integers that may take on any value are represented as two's complement. Integers that must always be nonnegative are encoded as unsigned.

The *tag field* is encoded as one or more identifier octets. This encoding must show the definition of the corresponding ASN.1 type. The BER does this by encoding the ASN.1 tag of the type.

There are four classes of tags in ASN.1:

- *universal tags*—for well-known data types;
- *application-wide tags*—which are defined in a single ASN.1 module;
- *context-specific tags*—which are used to provide distinguishing information in constructor types; and
- *private-use tags*—which are used by consenting parties.

Bits 7 and 8 encode the class of the tag according to the table shown in Figure 2.

Continued

FIGURE 2 *Encoding of the Class of a Tag*

Class	Bit 8	Bit 7
Universal	0	0
Application	0	1
Context-specific	1	0
Private	1	1

In addition to belonging to one of these groups, a tag has associated with it a nonnegative integer. The tag field generated by the BER must encode not only the tag's class but the tag's number as well.

For tags with a number ranging from zero to 30 inclusive, the identifier octets comprise a single octet encoded as follows:

- bits 8 and 7 are encoded to represent the *class* of the tag;
- bit 6 is a zero if the encoding is *primitive* or 1 if the encoding is *constructed;* and
- bits 5 to 1 encode the number of the tag as a binary integer with bit 5 as the most significant bit.

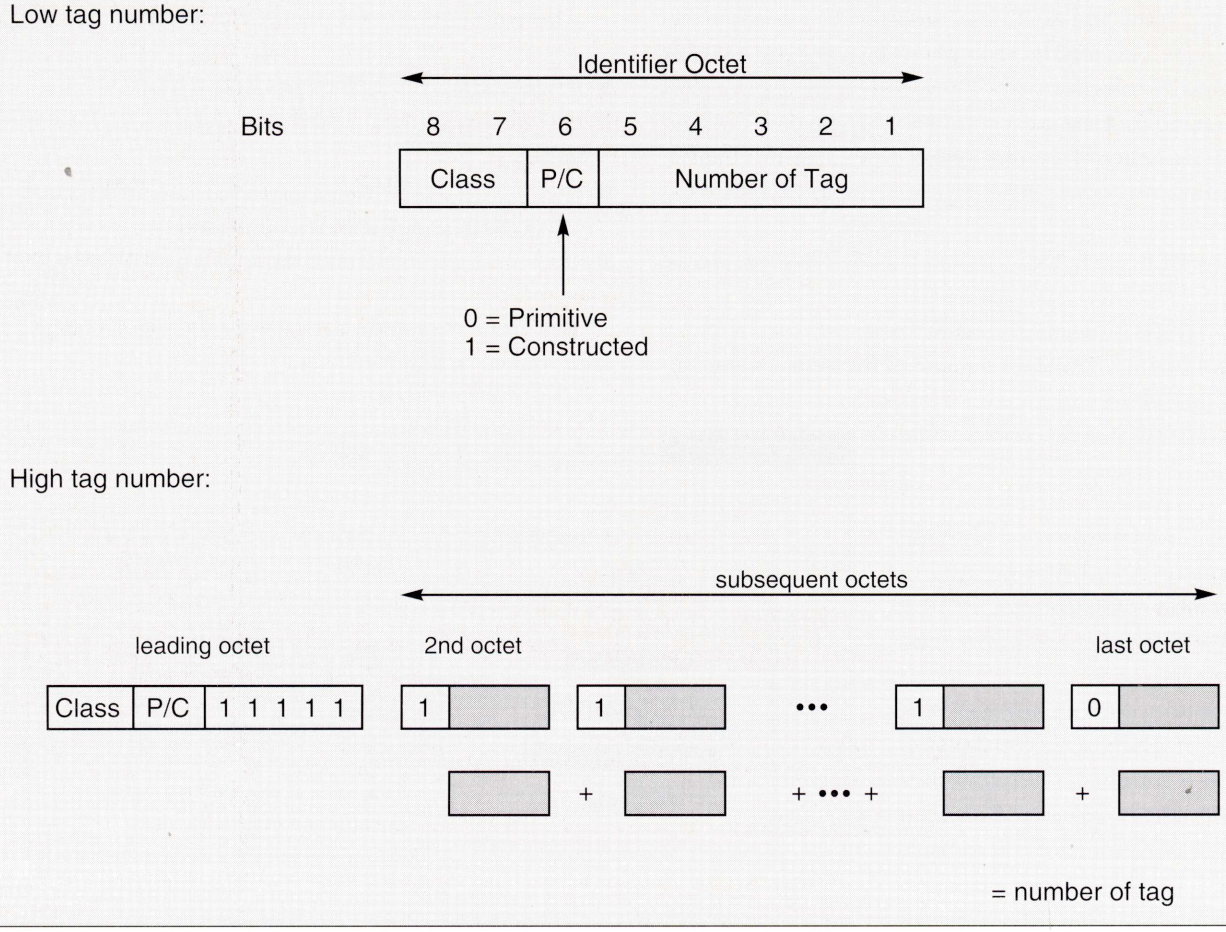
For tags with a number greater than or equal to 31, the identifier is a leading octet followed by one or more subsequent octets. The leading octet is encoded as follows:

- bits 8 and 7 are encoded to represent the *class* of the tag;
- bit 6 is a zero if the encoding is *primitive* or 1 if the encoding is *constructed;* and
- bits 5 to 1 are encoded as 11111_2.

The subsequent octets encode the tag as follows:

- bit 8 of each octet is set to 1 unless it is the last octet of the identifier octets; and
- bits 7 to 1 of the first subsequent octet followed by bits 7 to 1 of further octets up to and including the last subsequent

FIGURE 3 *Identifier Octets Encoding*



FOR HP

Storage facility.

Now, you have easy access to unlimited storage options. Bering – the preferred name in peripherals for Hewlett-Packard computer users – provides a complete line of tape drives, removable cartridge drives, fixed hard drives and combination subsystems. You can count on Bering for compatibility, reliability, convenience and service.

Our newest feature, standard on many of our models, allows conversion from HP-IB to SCSI interface with the simple push of a button. Migration to the latest SCSI-based computer systems is easy and economical. Bering's unique built-in dual interface switch allows the same drive to integrate with either interface.

That's extra value, and yet another good reason to buy Bering.



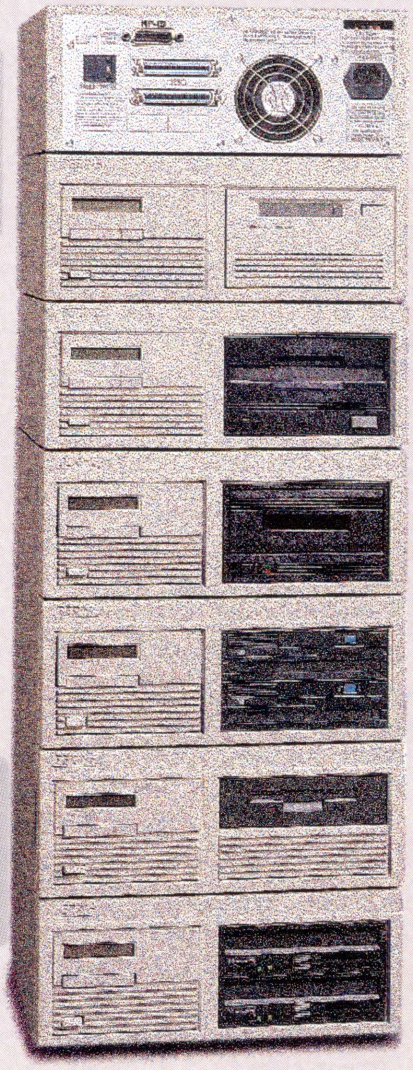
4mm DAT/DDS Technology
ECHO Series
High Performance, High Capacity 2GB DDS Tape Cartridge Backup Subsystem. Fast, efficient and cost effective. HP DDS compatible. SCSI and/or HP-IB interface.



8mm Technology
ECHO Series
High Performance, High Capacity Tape Backup Subsystem. Up to 5GB on an inexpensive cartridge. SCSI and/or HP-IB interface.



Winchester Technology
ECONOPAC II Series
High performance 80MB to 1.7GB fixed hard drives for basic storage needs. HP-IB and/or SCSI interface. HP-IB drives are available with 2.0MB FDD. Designed and tested to replace the discontinued HP9153C hard disk and floppy disk drives.





Convert between SCSI and HP-IB interfaces with the simple push of a button.

Rewritable Magneto-Optical Technology
OPTIPAC Series

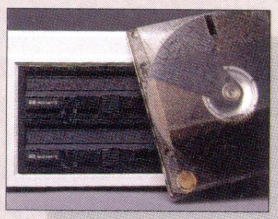


Up to 128MB on 3.5-inch, or 650MB to 1GB with 5.25-inch cartridges. Rewritable, Removable Magneto-Optical Cartridge Drives in combination with a fixed hard drive up to 500MB. SCSI and/or HP-IB. Multifunction model also available.



Bernoulli® Technology
MULTIPAC Series
Single or Dual, 44MB or 90MB Removable Cartridge Drive models. Available in combination with fixed hard drive. HP-IB interface. 90MB model with SCSI and/or HP-IB.

SyQuest® Technology
MEGAPAC Series



Single or Dual, 44MB or 88MB Removable Cartridge Drives. Available in combination with fixed hard drive. SCSI and/or HP-IB interface.

HP 9000, 1000 and 3000 computer users – the storage options are stacked in your favor.

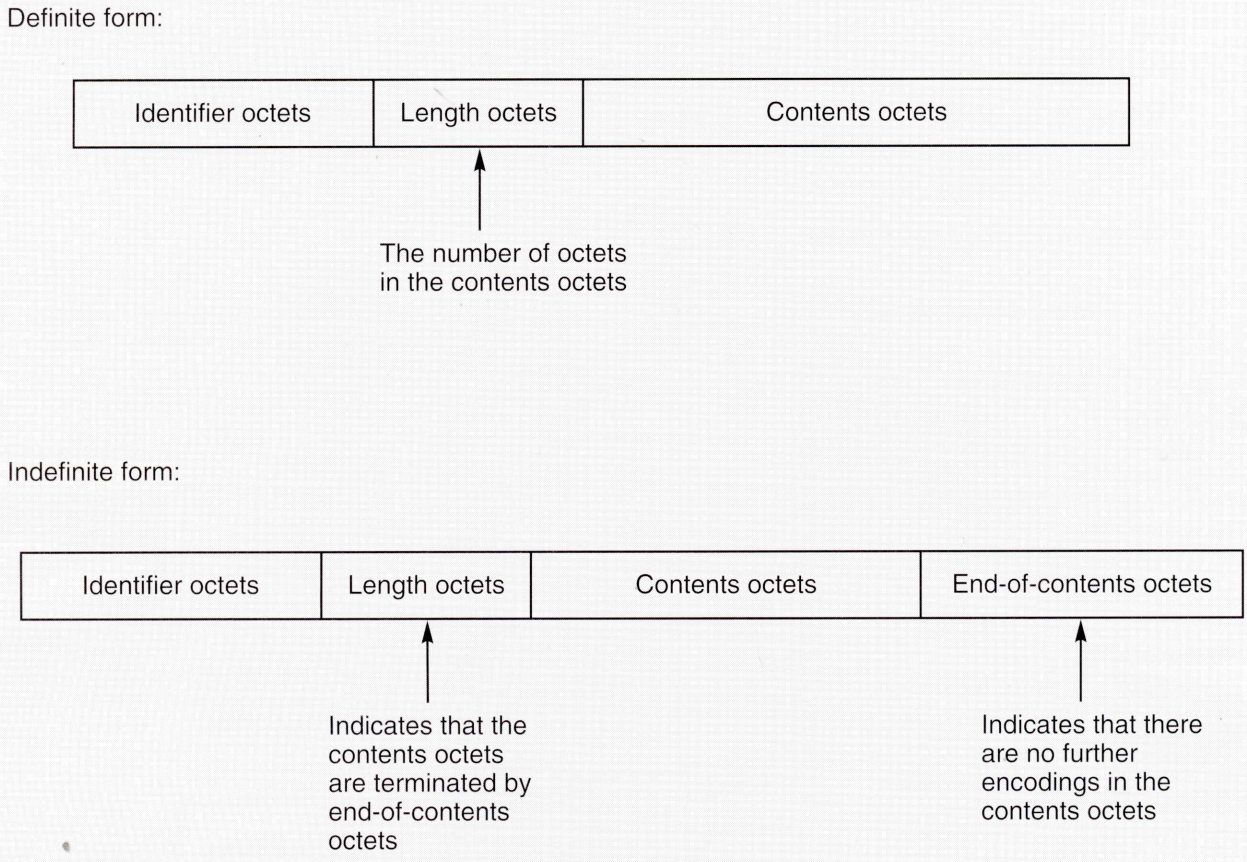
BERING™

©1992 Bering Industries, Inc.
Echo, EconoPac II, OptiPac, MultiPac and MegaPac are trademarks of Bering Industries.
Other product names are trademarks of their respective owners.

Bering Industries, Inc.
246 East Hacienda Avenue
Campbell, California 95008
800 237-4641 408 379-6900
fax 408 374-8309

CIRCLE 24 ON READER CARD

FIGURE 4 *BER View of an Octet*



octet in the identifier are the encoding of an unsigned binary integer equal to the tag number (bit 7 of the first subsequent octet is the most significant bit of the tag). See Figure 3.

The length field is encoded as one or more octets. This encoding indicates how many of the octets that follow make up the value of the ASN.1 type being encoded. The length field may be *indefinite* or *definite*. In the indefinite case, the length of the encoding is not known ahead of time and the receiver of the encoded message should look for a special sequence of octets to indicate the *end-of-contents*. The BER must ensure that no encoding of an ASN.1 type will be able to generate this sequence as a value.

In the definite case, the length of the encoding is known. The length field consists of one or more octets encoding the integer-valued length. If the number of octets is less than 128, a single octet can be used to encode the length. If the length is longer, the first octet has the high-order bit set to 1 and the remaining seven bits comprise a number saying how many octets follow in the length field.

SNMP specifically disallows the use of the indefinite form for all messages and for all management information carried by those messages. This form places a large burden on the SNMP entity receiving the message (either manager or agent). See Figure 4.

The value field is encoded as zero or more contents octets. Each ASN.1 type has a unique encoding. The types and their hierarchy are as follows:

- Simple types (bit 6 of the first octet of the tag is zero)

`INTEGER`: a data type taking a cardinal number as its value. Note that since ASN.1 is describing a conceptual integer, there is no limitation to the bit-level precision that may be required to represent the number. `INTEGER`s have a universal tag of `0x02`.

`OCTET STRING`: a data type taking zero or more octets as its value. Each octet may take any value from 0 to 255. `OCTET`

STRINGs have a universal tag of 0x04.

NULL: a data type acting as a place holder. This type exists but it is currently not used. NULLs have a universal tag of 0x05.

OBJECT IDENTIFIER: a data type denoting an authoritatively named object. An OBJECT IDENTIFIER is a sequence of nonnegative values that traverse a tree (the MIB). When describing an OBJECT IDENTIFIER, the most concise format is to list the integer values found by traversing the MIB tree starting at the root and proceeding to the object in question. In the sample MIB for SNMP-aircraft, the OBJECT IDENTIFIER of the planeName object would be:

```
1.3.6.1.4.1.9999.2.1
```

OBJECT IDENTIFIERs have a universal tag of 0x06.

- Constructor types (bit 6 of the first octet of the tag is 1)

SEQUENCE: a data type denoting an ordered list of zero or more elements which are other ASN.1 types. This is similar to a structure in C or a record in Pascal.

SEQUENCE OF: a data type denoting an ordered list of zero or more elements of the same ASN.1 type. This is analogous to the dynamic array in many programming languages—the number of elements is not usually known until the array is created but each element of the array has the same syntax. SEQUENCE OFs have the same tag as SEQUENCEs.

SEQUENCEs and SEQUENCE OFs have a universal tag of 0x10, but since they are constructor types, bit 6 of their tags is set to 1. Therefore, the value of their tags is 0x30.

ASN.1 Encodings Used by SNMP

The SNMP Structure of Management Information derives some additional syntaxes for management information objects from the fundamental types specified by ISO in the ASN.1 specifications. These additional syntaxes are discussed below.

- IpAddress: an OCTET STRING of length 4. Each of the four octets represents each of the four bytes of an IP address. An IpAddress has a tag of 0x40 (an application-defined tag of 0x00).
- NetworkAddress: a data type representing an address from one of possibly several protocol families. At present it is the same as an IpAddress.
- Counter: a data type representing a nonnegative integer that monotonically increases until it reaches a maximum value and then wraps back to zero. A Counter is an INTEGER in the range 0..4294967295 and has a tag of 0x41 (an application-wide tag of 0x01).
- Gauge: a data type representing a nonnegative integer that may increase or decrease. However, a Gauge latches at a maximum value. A Gauge is an INTEGER in the range 0..4294967295 and has a tag of 0x42 (an application-wide tag of 0x02).
- TimeTicks: a data type representing a nonnegative integer that counts the time in hundredths of a second since some epoch. The definition of each object with a syntax of TimeTicks must identify the corresponding epoch. A TimeTicks is an INTEGER in the range 0..4294967295 and has a tag of 0x43 (an application-wide tag of 0x03).
- Opaque: a data type representing an arbitrary encoding. Opaque objects have a tag of 0x44 (an application-wide tag of 0x04).

SNMP PDU types

Each SNMP packet is represented as a SEQUENCE of the following items (all of this is encoded according to the rules of the ASN.1 BER given above):

- a version number (an INTEGER valued at zero for the current version);
- a community name (an OCTET STRING); and
- arbitrary data.

The "arbitrary data" portion is a SEQUENCE of the following (this part is called an SNMP *protocol data unit*):

- a tag representing the PDU type—0 for *GetRequest* (encoded as 0xA0); 1 for *GetNextRequest* (encoded as 0xA1); 2 for *GetResponse* (encoded as 0xA2); and 3 for *SetRequest* (encoded as 0xA3);
- the encoded length of the PDU in octets;
- an INTEGER request id (used by the agent and manager for correlating requests and replies);
- an INTEGER error status with zero indicating noError and positive values indicating the type of error (packet too big, set on a read-only object, etc.);
- an INTEGER error index that gives the zero-relative index of the VarBind in the following SEQUENCE of VarBinds that caused the error (if the PDU is a *GetResponse* containing an error); and
- a SEQUENCE of VarBinds.

I'll discuss VarBinds in a minute. The *Trap* PDU has a format different from the *GetRequest*, *GetNextRequest*, *GetResponse*, and

SetRequest. The format is as follows:

- a tag representing the PDU type—4 for *Trap* (encoded as `0xA4`);
- the encoded length of the PDU in octets;
- an `OBJECT IDENTIFIER` representing the `sysObjectID` of the agent (`sysObjectID` is a MIB object that all agents support—it identifies the type of agent);
- the `NetworkAddress` of the agent sending the trap;
- an `INTEGER` identifying the *generic* type of trap (the value is `0-6` inclusive—the reader should consult Rose [11] for a more specific description);
- an `INTEGER` representing a *specific* type of trap (this is usually `0` unless the generic trap type is `6-enterpriseSpecific`);
- a `TimeTicks` representing the time the trap was sent. (Note that this is the value of the `sysUpTime` object, another object that all agents support. It is the time in tens of milliseconds since the agent was last initialized. It is up to the manager to convert this into a meaningful time for the user.); and
- a `SEQUENCE` of `VarBinds` (the protocol specification terms this "interesting information").

A `VarBind` is a `SEQUENCE` of an `ObjectName` and an `ObjectSyntax`. An `ObjectName` is the `OBJECT IDENTIFIER` for the object—a sequence of nonnegative values that traverses a tree (the MIB) and names the object authoritatively. The `ObjectSyntax` is the ASN.1-encoded value of the object. Remember that the ASN.1 encoding contains information about the type—`INTEGER, Gauge,` etc.—of the object (this information is carried in the tag part of the encoding) named by the `ObjectName` and the *proposed* value of the object (in a *SetRequest*) or the *current* value of the object (in a *GetRequest*, *GetNextRequest*, or *GetResponse*).

Many *GetRequest*s, *GetNextRequest*s, and *SetRequest*s can be contained in a single frame. However, the operations performed are considered to be atomic and all the requests must be successful or the *GetResponse* PDU that constitutes the reply will be a PDU containing an error. If a PDU contains both *GetRequest*s and *SetRequest*s and all the *SetRequest*s succeed but a *GetRequest* fails, an error will be returned in a *GetResponse* to the manager and all the *SetRequest*s will be "backed out" by the agent.

Examples

The following examples motivate the decoding algorithm given in the C routines on pages 33–47. The first two examples show a *SetRequest* and its following *GetResponse*. The third example shows a *Trap*. The objects in the first two examples come from the sample MIB for `SNMP-aircraft` given on pages 30–33. The *Trap* is a `linkDown` trap.

Note that, in the function:

```
void Decode_SNMP_Message(packet,  dataLen)
unsigned char *packet; /* pointer to first octet of SNMP
                          message */
int           dataLen; /* number of octets in SNMP
                          message     */
```

the parameter packet must point to the first octet of the SNMP part of the message. If the message appears in an Ethernet frame, the SNMP part of the packet will commence at the 43rd octet:

Destination MAC address -	6 octets
Source MAC address -	6 octets
Ethernet type field -	2 octets (always `0x0800` for IP)
IP header -	20 octets (assuming no IP options)
UDP header -	8 octets
	42 octets header information

SetRequest

Following is an encoded SNMP *SetRequest*. This *SetRequest* attempts to set the `carName` object (from the `SNMP-aircraft` MIB) of some SNMP-manageable entity to "SNMP-planes Model XLNT."

```
30 40 02 01 00 04 08 68 70 5F 61 64 6D 69 6E A3 31 02 02 44 4D 02
01 00 02 01 00 30 25 30 23 06 09 2B 06 01 04 01 CE 0F 02 01 04 16
53 4E 4D 50 2D 70 6C 61 6E 65 73 20 4D 6F 64 65 6C 20 58 4C 4E 54
34 F7 D4 39
```

Following the flow of the program, this request would decode as follows:

All SNMP messages are SEQUENCEs:

`30` [the tag for a SEQUENCE]
`40` [the encoded length of the SEQUENCE...64 octets]

The SNMP version:

02 [the tag for an INTEGER]
01 [the encoded length of the INTEGER...1 octet]
00 [the encoded value of the INTEGER...zero]

The SNMP community:

04 [the tag for an OCTET STRING]
08 [the encoded length of the OCTET STRING...8 octets]
68 70 5F 61 64 6D 69 6E [the encoded value of the OCTET STRING...hp_admin]

The SNMP PDU type:

A3 [the tag for a SET-PDU]
31 [the encoded length of the SET-PDU...49 octets]

The request id:

02 [the tag for an INTEGER]
02 [the encoded length of the INTEGER...1 octet]
44 4D [the encoded value of the INTEGER...0x444D]

The error code:

02 [the tag for an INTEGER]
01 [the encoded length of the INTEGER...1 octet]
00 [the encoded value of the INTEGER...zero (noError)]

The error index:

02 [the tag for an INTEGER]
01 [the encoded length of the INTEGER...1 octet]
00 [the encoded value of the INTEGER...zero]

The SEQUENCE marking the beginning of the VarBindList:

30 [the tag for a SEQUENCE]
25 [the encoded length of the SEQUENCE...37 octets]

The SEQUENCE marking the beginning of the first VarBind:

30 [the tag for a SEQUENCE]
23 [the encoded length of the SEQUENCE...35 octets]

The OBJECT IDENTIFIER of the VarBind:

06 [the tag for an OBJECT IDENTIFIER]
09 [the encoded length of the OBJECT IDENTIFIER...9 octets]
2B 06 01 04 01 CE 0F 02 01
[the encoded value of the OBJECT IDENTIFIER...1.2.4.1.4.1.999.2.1]

The value of the VarBind:

04 [the tag for an OCTET STRING]
16 [the encoded length of the OCTET STRING...22 octets]
53 4E 4E 50 2D 70 6C 61 6E 65 73
20 4D 6F 64 65 6C 20 58 4C 4E 54
[the encoded value of the OCTET STRING... SNMP-planes Model XLNT]

The GetResponse immediately following

Following is an encoded SNMP *GetResponse*. This *GetResponse* is the response to the previous *SetRequest* to set the `planeName` object (from the `SNMP-aircraft` MIB). As you can see, the *GetResponse* is identical to the *SetRequest* except for the error and the PDU type.

```
30 40 02 01 00 04 08 68 70 5F 61 64 6D 69 6E A2 31 02 02 44 4D 02
01 02 02 01 01 30 25 30 23 06 09 2B 06 01 04 01 CE 0F 02 01 04 16
53 4E 4D 50 2D 6D 6F 74 6F 72 73 20 4D 6F 64 65 6C 20 58 4C 4E 54
6B AE A4 53
```

Following the flow of the program, this response would decode as follows:

All SNMP messages are SEQUENCEs:

30 [the tag for a SEQUENCE]
40 [the encoded length of the SEQUENCE...64 octets]

The SNMP version:

02 [the tag for an INTEGER]
01 [the encoded length of the INTEGER...1 octet]
00 [the encoded value of the INTEGER...zero]

The SNMP community:

```
04 [the tag for an OCTET STRING]
08 [the encoded length of the OCTET STRING...8 octets]
68 70 5F 61 64 6D 69 6E [the encoded value of the OCTET
                         STRING...hp_admin]
```

The SNMP PDU type:

```
A2 [the tag for a RESPONSE-PDU]
31 [the encoded length of the RESPONSE-PDU...49 octets]
```

The request id:

```
02 [the tag for an INTEGER]
02 [the encoded length of the INTEGER...1 octet]
44 4D [the encoded value of the INTEGER...0x444D]
```

The error code:

```
02 [the tag for an INTEGER]
01 [the encoded length of the INTEGER...1 octet]
02  [the encoded value of the INTEGER...zero
    (noSuchName)]
```

The error index:

```
02 [the tag for an INTEGER]
01 [the encoded length of the INTEGER...1 octet]
00 [the encoded value of the INTEGER...zero]
```

The SEQUENCE marking the beginning of the VarBindList:

```
30 [the tag for a SEQUENCE]
25 [the encoded length of the SEQUENCE...37 octets]
```

The SEQUENCE marking the beginning of the first VarBind:

```
30 [the tag for a SEQUENCE]
23 [the encoded length of the SEQUENCE...35 octets]
```

The OBJECT IDENTIFIER of the VarBind:

```
06 [the tag for an OBJECT IDENTIFIER]
09    [the encoded length of the OBJECT
      IDENTIFIER...9 octets]
2B 06 01 04 01 CE 0F 02 01
      [the encoded value of the OBJECT
      IDENTIFIER...1.2.4.1.4.1.999.2.1]
```

The value of the VarBind:

```
04 [the tag for an OCTET STRING]
16 [the encoded length of the OCTET STRING...22 octets]
53 4E 4E 50 2D 70 6C 61 6E 65 73
20 4D 6F 64 65 6C 20 58 4C 4E 54
      [the encoded value of the OCTET
      STRING...SNMP-planes Model XLNT]
```

Since this *GetResponse* returned a `noSuchName` error, we know that the `carName` object is not present in this SNMP-manageable entity (in SNMP parlance, "the object is not in the agent's MIB view"). In fact, the *SetRequest* was sent to and the *GetResponse* was returned from an HP workstation.

A Trap

The first two examples showed relatively simple PDUs. The PDUs contained only one VarBind in the VarBindList and there were no examples of the "multiple octet form" of encoded lengths. The following *Trap* reports a `linkDown` condition and contains both:

```
30 82 00 96 02 01 00 04 06 70 75 62 6C 69 63 A4 82 00
87 06 0B 2B 06 01 04 01 0B 02 03 07 01 01 40 04 0F 03
08 5D 02 01 06 02 01 00 43 04 05 90 1A AF 30 82 00 64
30 82 00 1D 06 0D 2B 06 01 04 01 0B 02 0E 01 07 03 03
01 06 0C 2B 06 01 04 01 0B 02 0E 01 09 02 01 30 82 00
12 06 0D 2B 06 01 04 01 0B 02 0E 01 07 03 04 01 02 01
50 30 82 00 12 06 0D 2B 06 01 04 01 0B 02 0E 01 07 03
05 01 02 01 50 30 82 00 13 06 0D 2B 06 01 04 01 0B 02
0E 01 07 03 06 01 43 02 17 70 3A E3 77 D3
```

Following the flow of the program, this trap would decode as follows:

All SNMP messages are SEQUENCEs:

```
30 [the tag for a SEQUENCE]
82 00 96 [the encoded length of the
```

SEQUENCE...150 octets]

The SNMP version:

```
02 [the tag for an INTEGER]
01 [the encoded length of the INTEGER...1 octet]
00 [the encoded value of the INTEGER...zero]
```

The SNMP community:

```
04 [the tag for an OCTET STRING]
06 [the encoded length of the OCTET STRING...8 octets]
70 75 62 6C 69 63 [the encoded value of the
                   OCTET STRING...public]
```

The SNMP PDU type:

```
A4 [the tag for a TRAP-PDU]
82 00 87 [the encoded length of the
          TRAP-PDU...135 octets]
```

The OBJECT IDENTIFIER of the Enterprise:

```
06 [the tag for an OBJECT IDENTIFIER]
0B [the encoded length of the OBJECT
   IDENTIFIER...11 octets]
2B 06 01 04 01 0B 02 03 07 01 01
     [the encoded value of the OBJECT
      IDENTIFIER...1.3.6.1.4.1.11.2.3.7.1.1]
```

The IpAddress of the agent:

```
40 [the tag for an IpAddress]
04 [the encoded length of the IpAddress...4 octets]
   0F 03 08 5D
   [the encoded value of the IpAddress...15.3.8.93]
```

The Generic Trap type:

```
02 [the tag for an INTEGER]
01 [the encoded length of the INTEGER...1 octet]
06 [the value of the INTEGER...6 (linkDown)]
```

The Specific Trap type:

```
02 [the tag for an INTEGER]
01 [the encoded length of the INTEGER...1 octet]
00 [the value of the INTEGER...zero]
```

The Timestamp:

```
43 [the tag for a TimeTicks]
04 [the encoded length of the TimeTicks...4 octets]
05 90 1A AF [the value of the TimeTicks...0x05901aaf]
```

The SEQUENCE marking the beginning of the VarBindList (*n.b.*, the SNMP protocol specification terms this part of the PDU "interesting information"—consequently, the contents of *Traps* are vendor-specific):

```
30 [the tag for a SEQUENCE]
82 00 64 [the encoded length of the SEQUENCE...100 octets]
```

The SEQUENCE marking the beginning of VarBind #1:

```
30 [the tag for a SEQUENCE]
82 00 1D [the encoded length of the SEQUENCE...29 octets]
```

The OBJECT IDENTIFIER of VarBind #1:

```
06 [the tag for an OBJECT IDENTIFIER]
0D [the encoded length of the OBJECT
    IDENTIFIER...13 octets]
2B 06 01 04 01 0B 02 0E 01 07 03 03 01
     [the encoded value of the OBJECT
      IDENTIFIER...1.3.6.1.4.1.11.2.14.1.7.3.3.1]
```

The value of VarBind #1:

```
06 [the tag for an OBJECT IDENTIFIER]
0C [the encoded length of the OBJECT
    IDENTIFIER...12 octets]
2B 06 01 04 01 0B 02 0E 01 09 02 01
     [the encoded value of the OBJECT
      IDENTIFIER...1.3.6.1.4.1.11.2.14.1.9.2.1]
```

The SEQUENCE marking the beginning of VarBind #2:

```
30 [the tag for a SEQUENCE]
82 00 12 [the encoded length of the SEQUENCE...18 octets]
```

The OBJECT IDENTIFIER of VarBind #2:

```
06 [the tag for an OBJECT IDENTIFIER]
0D    [the encoded length of the OBJECT
      IDENTIFIER...13 octets]
2B 06 01 04 01 0B 02 0E 01 07 03 04 01
    [the encoded value of the OBJECT
    IDENTIFIER...1.3.6.1.4.1.11.2.14.1.7.3.4.1]
```

The value of VarBind #2:

```
02 [the tag for an INTEGER]
01 [the encoded length of the INTEGER...1 octet]
50 [the encoded value of the INTEGER....0x50]
```

The SEQUENCE marking the beginning of VarBind #3:

```
30 [the tag for a SEQUENCE]
82 00 12 [the encoded length of the SEQUENCE...18
octets]
```

The OBJECT IDENTIFIER of VarBind #3:

```
06 [the tag for an OBJECT IDENTIFIER]
0D    [the encoded length of the OBJECT
      IDENTIFIER...13 octets]
2B 06 01 04 01 0B 02 0E 01 07 03 05 01
    [the encoded value of the OBJECT
    IDENTIFIER...1.3.6.1.4.1.11.2.14.1.7.3.5.1]
```

The value of VarBind #3:

```
02 [the tag for an INTEGER]
01 [the encoded length of the INTEGER...1 octet]
50 [the encoded value of the INTEGER...0x50]
```

The SEQUENCE marking the beginning of VarBind #4:

```
30 [the tag for a SEQUENCE]
82 00 13 [the encoded length of the SEQUENCE...19 octets]
```

The OBJECT IDENTIFIER of VarBind #4:

```
06 [the tag for an OBJECT IDENTIFIER]
0D [the encoded length of the OBJECT
   IDENTIFIER...13 octets]
2B 06 01 04 01 0B 02 0E 01 07 03 06 01
    [the encoded value of the OBJECT
    IDENTIFIER...1.3.6.1.4.1.11.2.14.1.7.3.6.1]
```

The value of VarBind #4:

```
43 [the tag for a TimeTicks]
02 [the encoded length of the TimeTicks...2 octets]
17 70 [the encoded value of the TimeTicks...0x1770]
```

Conclusion

SNMP's designers adhered to several design goals during the protocol's comparatively brief development time:

- keep the agent simple—minimize the number and complexity of the agent's responsibilities
- make SNMP monitoring and control extensible to accommodate unanticipated aspects of network operations
- make SNMP's architecture independent of any particular host/gateway architectures

SNMP's designers achieved the first goal by limiting the number of different types of PDUs to three—*GetRequest/SetRequest/GetNextRequest*, *GetResponse*, and *Trap*, and by requiring only connectionless datagram transport. Simplifying the agent reduces vendor development costs—making it more attractive for network element vendors to support SNMP. Widespread availability of SNMP agents is a prerequisite for both user acceptance and for stimulating network management system vendors to build SNMP manager implementations.

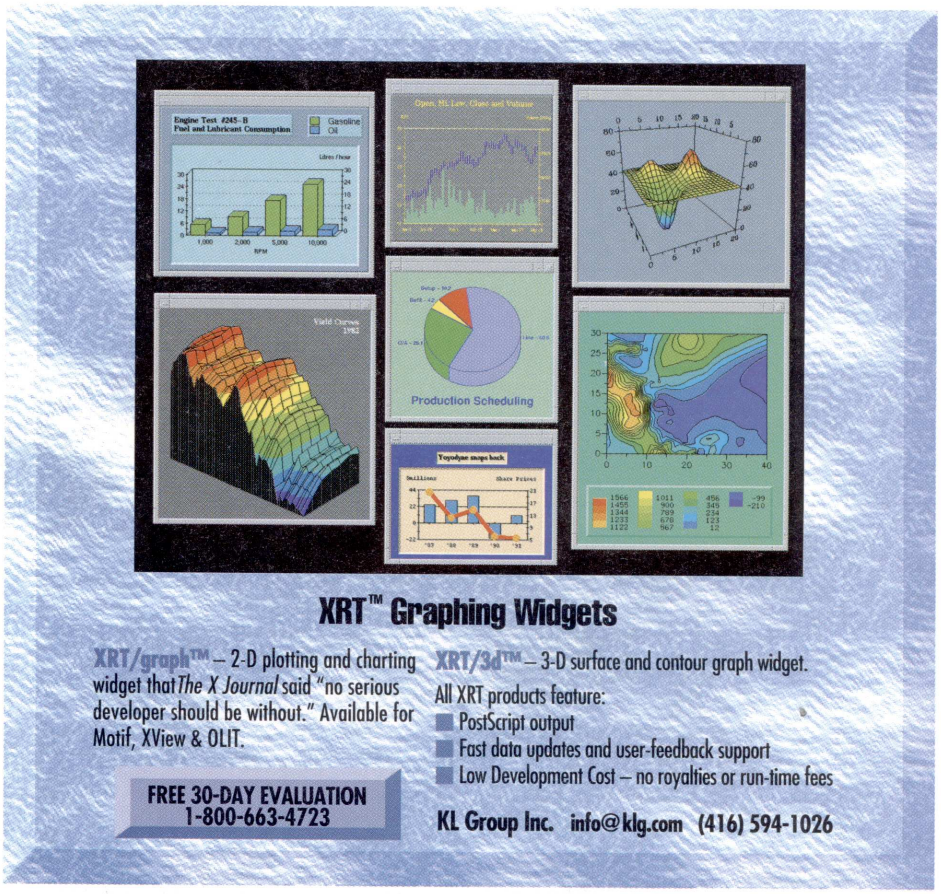
The second goal is realized by employing the MIB. The current Internet-standard MIB-II will evolve and expand to include more objects—thus giving network managers more control over their networks. New objects are added by integrating new subtrees into the MIB. The MIB can easily be traversed using the *GetRequest* or the *GetNextRequest*.

The third goal is realized by the open communications architecture above which SNMP operates and by SNMP's ability to operate over many different transports. In addition, through the use of ASN.1 encoding, SNMP is not tied to any specific machine architecture.

SNMP's designers successfully created a new vehicle for multi-vendor network management—a first step toward solving an increasingly critical problem. SNMP is, indeed, mere-

ly a vehicle; the protocol itself is far less important than the tools and applications that must be developed to support it. How the data is gathered is less important to users than what they do with the data. Most of the work lies ahead, as users gain experience with managing multi-vendor networks and determining what works and what doesn't.

Note: This article continues with listings, which begin on page 30:



CIRCLE 37 ON READER CARD

REFERENCES

1. Jeffrey D. Case, Mark S. Fedor, Martin L. Schoffstall, and James R. Davin, *Simple Network Management Protocol,* Internet Working Group Request for Comments 1157, DDN Network Information Center, SRI International, 1990.

2. Information Processing Systems - Open Systems Interconnection, *Specification of Abstract Syntax Notation One (ASN.1),* International Standard 8824, International Organization for Standardization, 1987.

3. Information Processing Systems - Open Systems Interconnection, *Specification of Basic Encoding Rules for Abstract Syntax Notation One (ASN.1),* Recommendation X.209, International Organization for Standardization, 1988.

4. Keith Z. McCloghrie and Marshall T. Rose, *Toward Concise MIB Definitions,* Internet Working Group Request for Comments 1212, DDN Network Information Center, SRI International, 1990.

5. Keith Z. McCloghrie and Marshall T. Rose, *A Convention for Describing SNMP-based Agents,* Internet Working Group Request for Comments 1303, DDN Network Information Center, SRI International, 1992.

6. Marshall T. Rose and Keith Z. McCloghrie, *Structure and Identification of Management Information for TCP/IP-based Internets,* Internet Working Group Request for Comments 1155, DDN Network Information Center, SRI International, 1988.

7. Marshall T. Rose (ed.), *Managment Information Base for Network Management of TCP/IP-based Internets: MIB-II,* Internet Working Group Request for Comments 1213, DDN Network Information Center, SRI International, 1990.

8. Marshall T. Rose, *A Convention for Defining Traps for use with the SNMP,* Internet Engineering Task Force Draft, DDN Network Information Center, SRI International, 1990.

9. Marshall T. Rose, *The Simple Book—An Introduction to Management of TCP/IP-based Internets,* Prentice-Hall, 1991. ◧

Steve Witten works for the Hewlett-Packard Co. in the Network Test Division of the Test and Measurement Organization. During his 14-year tenure at HP, Steve has worked on various software projects ranging from energy management to the design of user interface development tools. Steve is currently engaged in the design and implementation of an SNMP manager for distributed local area network monitoring systems. Following is the path to Steve's door stevewi@hpspd.spd.hp.com.

A Sample MIB Specification

```
SNMP-aircraft-MIB DEFINITIONS ::= BEGIN

-- This is a comment.

-- This is the global information module for
-- the SNMP-aircraft MIB.

IMPORTS
        enterprises
                FROM RFC1155-SMI;

-- This MIB is located in the MIB tree under the
-- "enterprises" subtree.  By rooting this MIB at
--                enterprises 9999
-- we establish a "prefix" for every object in this
-- MIB.  This prefix is:
--                1.3.6.1.4.1.9999
-- or (using the names of the nodes)
--    iso.org.dod.internet.private.enterprises.9999


SNMP-aircraft OBJECT IDENTIFIER ::= { enterprises 9999 }

END

SNMP-aircraft-plane-MIB DEFINITIONS ::= BEGIN

-- This is the definitions module for the
-- SNMP-aircraft MIB.  It defines the modules
-- from which the object definitions below
-- import information.

IMPORTS
        SNMP-aircraft
                FROM SNMP-aircraft-MIB;

IMPORTS
        OBJECT TYPE, ObjectName, NetworkAddress,
        IpAddress, Counter, Gauge, TimeTicks, Opaque
                FROM RFC1155-SMI;

-- This is the definition of the "groups" of
-- objects for this MIB.  There is only one
-- group called "plane."
```

Continued

A Sample MIB Specification continued

```
-- The prefix for every object in this group
-- is:
--              SNMP-aircraft.2

plane OBJECT IDENTIFIER ::= { SNMP-motors 2 }

-- Implementation of the plane group is mandatory
-- for all SNMP-aircraft planes.


-- Following are the definitions for all the
-- objects in the plane group.

planeName OBJECT-TYPE
        SYNTAX DisplayString (SIZE (0..64))
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
                "A textual name of the plane."
        ::= { car 1 }

planeLength OBJECT-TYPE
        SYNTAX INTEGER (0..100)
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
                "The length of the plane in feet."
        ::= { car 2 }

planePassengers OBJECT-TYPE
        SYNTAX INTEGER (0..4)
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
                "The number of passengers in the plane."
        ::= { car 3 }


-- This is the definition of a table of objects.
-- Each row in the table represents a passenger
-- in the plane.  Each column of the table repre-
-- sents an attribute of a particular passenger.

planePassengerTable OBJECT-TYPE
        SYNTAX SEQUENCE OF CarPassengerEntry
```

Continued

Share Your Expertise

Submit an article to hp-ux/usr

hp-ux/usr editor Michael Ehrhardt seeks well written user-submitted articles that address the real problems of both the new HP-UX user and the experienced administrator. The overriding criterion for selecting articles will be their excellence in both content and presentation.

Authors of articles chosen to appear in *hp-ux/usr* will receive $50 per typeset page. Authors of articles that review hardware and software pertaining to HP-UX will receive an additional bonus of $300 to $800, depending upon the complexity of the review.

The preferred format for submitting copy is Version 2.0 of Word for Windows, followed in order of preference by Microsoft Word, Word for the MAC, or pure ASCII text. Copy should be sent via Internet e-mail or on floppy disks. Any graphics or figures should be submitted on disk in EPS or TIFF format.

For more information, contact Michael Ehrhardt at (800) INTEREX, (408) 747-0227, or Ehrhardt_Michael@interex.org

INTEREX

The International Association of Hewlett-Packard Computer Users

A Sample MIB Specification continued

```
        ACCESS not-accessible
        STATUS mandatory
        DESCRIPTION
                "A table describing each passenger."
        ::= { plane 4 }

planePassengerEntry OBJECT-TYPE
        SYNTAX SEQUENCE OF PlanePassengerEntry
        ACCESS not-accessible
        STATUS mandatory
        DESCRIPTION
                "A entry table describing each passenger."
        ::= { planePassengerTable 1 }

-- This sequence defines the objects (columns) in each row
-- of the table.

PlanePassengerEntry ::= SEQUENCE {
        planePindex
                INTEGER,
        planePname
                DisplayString,
        planePstatus
                INTEGER
}

planePindex OBJECT-TYPE
        SYNTAX INTEGER (1..4)
        ACCESS read-only
        STATUS mandatory
        DESCRIPTION
                 "Index for each passenger which ranges from
            1 to the value of planePassengers."
        ::= { planePassengerEntry 1 }

planePname OBJECT-TYPE
        SYNTAX DisplayString (SIZE (0..64))
        ACCESS read-write
        STATUS mandatory
        DESCRIPTION
                "The name of the passenger."
        ::= { planePassengerEntry 2 }


planePstatus OBJECT-TYPE
```

Continued

A Sample MIB Specification continued

```
        SYNTAX INTEGER { other(1),pilot(2) }
        ACCESS read-write
        STATUS mandatory
        DESCRIPTION
                "The status of the passenger."
        ::= { planePassengerEntry 3 }

END
```

An SNMP Packet Decoder

```
include <stdio.h>
#include <ctype.h>

/* Copyright 1988, 1989, Carnegie Mellon University */

/* ASN.1 definitions */

#define ASN_INT             2
#define ASN_STRING          4
#define ASN_NULL            5
#define ASN_OBJECT          6
#define ASN_SEQUENCE        0x30

/* ASN.1 definitions specifically for SNMP */

#define ASN_IP_ADDR         0x40
#define ASN_COUNTER         0x41
#define ASN_GAUGE           0x42
#define ASN_TIMETICKS       0x43
#define ASN_OPAQUE          0x44

/* SNMP PDU types */

#define SNMP_GET            0xA0
#define SNMP_GET_NEXT       0xA1
#define SNMP_RESPONSE       0xA2
#define SNMP_SET            0xA3
#define SNMP_TRAP           0xA4

/* SNMP trap types */

#define COLD_START              0x0
#define WARM_START              0x1
```

Continued

Interex is your HP-UX advocate

ad • vo • cate: to plead in favor of, *see support*

HP-UX users can rely on Interex, a 7,500-strong membership organization, as a powerful channel to Hewlett-Packard. Interex is committed to supporting HP-UX users through volunteer committees and special interest groups:

SIGUNIX—The Special Interest Group for UNIX, meets at the annual Interex HP Computer Users Conference to discuss areas of concern unique to HP-UX users and to share solutions.

Systems Improvement Committee/HP-UX—The SIC HP-UX pinpoints specific user needs for the HP-UX operating system and presents its requests for system upgrades, etc. to Hewlett-Packard.

Advocacy Coordinating Committee—The Advocacy Coordinating Committee facilitates communication between HP-UX users and Hewlett-Packard, enabling users to have specific concerns referred directly to the accountable HP entity. This committee tracks and manages all advocacy requests and publicly discloses the outcome of all advocacy isssues.

INTEREX

The International Association of Hewlett-Packard Computer Users

An SNMP Packet Decoder continued

```
#define LINK_DOWN              0x2
#define LINK_UP                0x3
#define AUTHENTICATION_FAILURE 0x4
#define EGP_NEIGHBOR_LOSS      0x5
#define ENTERPRISE_SPECIFIC    0x6

/* SNMP error types */

#define NO_ERROR               0x0
#define TOO_BIG                0x1
#define NO_SUCH_NAME           0x2
#define BAD_VALUE              0x3
#define READ_ONLY              0x4
#define GEN_ERROR              0x5

/* prototypes for ASN.1 parsing */

static int {Print_ASN1 (char *, unsigned char *, int);
static int Get_ASN1_length(register unsigned char **, register int *);

/* prototype to print an SNMP varbind */

static int Print_SNMP_variable(unsigned char *, int);

/* prototype to format an IP          */
/* address for printing               */

static char *unparse_ip(unsigned int ipaddr);

/* commonly used stuff defined as macros */

#define ADJUST_VARS(p,d,l) (p) += (l); (d) -= (l)

/* local buffers */

#define MAX_IP_ADDR_CHARS 20                /* for printing IP addresses */
static char ip_out[MAX_IP_ADDR_CHARS];      /* in "dot" format           */

/* a common error message */

static char noMoreData[] = "Incomplete ASN.1 object";

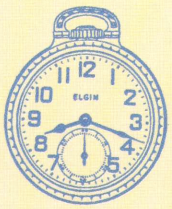
/* dump the packet data to the screen */

void PktDataDump(pkt, len)
```

Continued

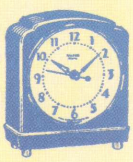
NBSPOOL

NBSPOOL FOR UNIX... IT'S ABOUT TIME



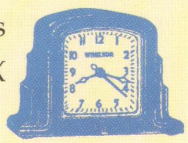
Spoolfile management for UNIX just got easier! NBSpool for UNIX gives operators and end users a simple yet powerful way of managing output and spooled devices. With NBSpool, the UNIX spooler can easily meet the heavy demands of commercial UNIX applications.

Capabilities Include: On-Line Report Viewing • Automatic Forms Alignment & Management • Easily Re-Order Printing Priority • Robust Subset Selection Criteria with Wild Cards • Restarting a Report at a Specific Page • Quickly Recover from Paper Jams • Print to Slave Printers • Automatically Archive Reports to Disc or Tape for Long Term Storage • Easy to use Command Syntax and On-Line Help.



For network users, NBSpool for UNIX lets you move output to printers connected to other systems such as the HP 3000 and DEC/VAX, or PC LAN's like AppleTalk, NetWare and LanManager.

NBSpool for UNIX has been designed to simplify and streamline all your spooling needs. As companies and organizations grow, NBSpool for UNIX offers options for expanding data processing needs previously unavailable.



FOR ADDITIONAL INFORMATION OR A DEMONSTRATION TAPE CONTACT:

QUEST software

Quest Software, Inc. 610 Newport Center Drive, Suite 890, Newport Beach, CA 92660 Phone: 714-720-1434 Fax: 714-720-0426

In Europe Contact:
System Software (Int.) UK (44) 0905 794646
ORBiT (33) 4025 1650 France • (49) 30 852 70 97 Germany
(31) 2979 41468 (Benelux) B.V. • (44) 372 360 333 UK
(45) 42 335959 (Scandinavia) AB

ONC/NFS

HEWLETT PACKARD
Premier Solution Provider

CIRCLE 02 ON READER CARD

An SNMP Packet Decoder continued

```
    char *pkt;      /* pointer into the packet  */
    int  len;       /* number of octets to dump */
{
  unsigned char u;

  printf("\t\t\t\tPacket data: ");
  while (len-- > 0) {
    u = (unsigned char)*pkt++;
    printf("%02x ",u);
  }
  printf("\n");
  return;
}

void Decode_SNMR_Message(packet, dataLen)
    unsigned char *packet;          /* pointer to first octet of SNMP message */
    int           dataLen;          /* number of octets in SNMP message       */
{
  int itemLen,i;
  unsigned char pdu_type;

  printf("SNMP message:\n");

  /* Check that first byte is type SEQUENCE */

  if (*packet != ASN_SEQUENCE) {
    printf("\tNot 'sequence' type: %#x", *packet);
    return;
  }
  printf("\tASN.1 type info:  0x%x (SEQUENCE)\n",*packet);

  dataLen--; packet++;        /* decrement number of octets in message */
  /* now that the sequence octet has been  */
  /* processed */

  /* process the SNMP message length */

  dataLen -= Get_ASN1_length(&packet, (int *)&itemLen);

  printf("\tSEQUENCE Length (Message length) is %d octets\n\n",itemLen);

  /* process the SNMP version field  */

  printf("\tSNMP version:\n");
  if ((itemLen = Print_ASN1("SNMP version: ", packet, dataLen)) == 0)
```

Continued

An SNMP Packet Decoder continued

```
  return;
printf("\n");
ADJUST_VARS(packet,dataLen,itemLen);

/* process the community name      */

printf("\tSNMP community:\n");
if ((itemLen = Print_ASN1("SNMP community: ", packet, dataLen)) == 0)
  return;
printf("\n");
ADJUST_VARS(packet,dataLen,itemLen);

/* process the SNMP PDU type       */

pdu_type = *packet;
ADJUST-VARS(packet,dataLen,1);

/* process the SNMP PDU            */

switch (pdu_type) {
case SNMP_GET:
  printf("\n\tSNMP PDU type: GET-PDU (0x%x)\n",pdu_type); /* GetRequest PDU */
  goto process_pdu;

case SNMP_GET_NEXT:
  printf("\n\tSNMP PDU type: GET-NEXT-PDU (0x%x)\n",pdu_type); /* GetNextRequest PDU */
  goto process_pdu;

case SNMP_RESPONSE:
  printf("\n\tSNMP PDU type: GET-RESPONSE-PDU (0x%x)\n",pdu_type); /* GetResponse PDU */
  goto process_pdu;

case SNMP_SET:
  printf("\n\tSNMP PDU type: SET-PDU (0x%x)\n",pdu_type); /* SetRequest PDU */

process_pdu:

  /* process the request id */

  /* Skip ?multi-byte? length too */

  printf("\tSNMP PDU length:\n");
  dataLen -= Get_ASN1_length(&packet, (int *)&itemLen);
  printf("\tSNMP PDU length: length: %d octets\n\n", itemLen);
```

Continued

An SNMP Packet Decoder continued

```
    printf("\tRequest-ID:\n");
    if ((itemLen = Print_ASN1("Request-ID: ", packet, dataLen)) == 0)
      return;
    printf("\n");

    ADJUST_VARS(packet,dataLen,itemLen);

    printf("\tError (");

    switch (*packet) {
    case NO_ERROR: printf("noError"); break;
    case TOO_BIG: printf("tooBig"); break;
    case NO_SUCH_NAME: printf("noSuchName"); break;
    case BAD_VALUE: printf("badValue"); break;
    case READ_ONLY: printf("readOnly"); break;
    case GEN_ERROR: printf("genError"); break;
    }

    printf("):\n");
    if ((itemLen = Print_ASN1("Error: ", packet, dataLen)) == 0)
      return;
    printf("\n");

    ADJUST_VARS(packet,dataLen,itemLen);

    printf("\tError-Index:\n");
    if ((itemLen = Print_ASN1("Error-Index: ", packet, dataLen)) == 0)
      return;
    printf("\n");

    ADJUST_VARS(packet,dataLen,itemLen);

    break;                          /* Go parse variable bindings */

  case SNMP_TRAP:
    printf("\n\tSNMP PDU type: TRAP-PDU (0x%x)\n",pdu_type); /* Trap PDU */

    /* Skip ?multi-byte? length too */

    printf("\tSNMP PDU length:\n");
    dataLen -= Get_ASN1_length(&packet, (int *)&itemLen);
    printf("\tSNMP PDU length: length: %d octets\n\n", itemLen);

    /* Enterprise */
```

Continued

An SNMP Packet Decoder continued

```
printf("\tEnterprise:\n");
if ((itemLen = Print_ASN1("Enterprise: ", packet, dataLen)) == 0)
  return;
printf("\n");
ADJUST_VARS(packet,dataLen,itemLen);

/* Network address */

printf("\tAgent-address:\n");
if ((itemLen = Print_ASN1("Agent-address: ", packet, dataLen)) == 0)
  return;
printf("\n");
ADJUST_VARS(packet,dataLen,itemLen);

/* Generic trap */

printf("\tGeneric-trap (");

switch(*packet) {
case COLD_START: printf("coldStart"); break;
case WARM_START: printf("warmStart"); break;
case LINK_DOWN: printf("linkDown"); break;
case LINK_UP: printf("linkUp"); break;
case AUTHENTICATION_FAILURE: printf("authenticationFailure"); break;
case EGP_NEIGHBOR_LOSS: printf("egpNeighborLoss"); break;
case ENTERPRISE_SPECIFIC: printf("enterpriseSpecific"); break;
}

printf("):\n");

if ((itemLen = Print_ASN1("Generic-trap: ", packet, dataLen)) == 0)
  return;
printf("\n");
ADJUST_VARS(packet,dataLen,itemLen);

printf("\tSpecific-trap:\n");
if ((itemLen = Print_ASN1("Specific-trap: ", packet, dataLen)) == 0)
  return;
printf("\n");
ADJUST_VARS(packet,dataLen,itemLen);

printf("\tTimestamp:\n");
if ((itemLen = Print_ASN1("Timestamp: ", packet, dataLen)) == 0)
  return;
printf("\n");
```

Continued

An SNMP Packet Decoder continued

```
    ADJUST_VARS(packet,dataLen,itemLen);

    break;                          /* Go parse variable bindings */

  default:                           /* Unkown PDU type */
    printf("\tUnknown PDU type 0x%x\n", pdu_type);
    return;
  }

  printf("\tVarBind-list:\n");
  printf("\t-------------\n");

  if (*packet++ != ASN_SEQUENCE) {
    printf("\tVariable list not a sequence\n");
    return;
  }
  printf("\t\tASN.1 type info:  0x%x (SEQUENCE)\n",*(packet-1));

  dataLen--; /* Account for type byte */
  dataLen -= Get_ASN1_length(&packet, (int *) &itemLen); /* Skip length too       */

  printf("\t\tSEQUENCE Length is %d octets\n",itemLen);

  dataLen=itemLen;

  i = 1;
  while (dataLen > 0) { /* Now print the variables */
    printf("\n\t     VarBind #%d:\n",i);
    printf("\t     ------------\n");
    if ((itemLen = (Print_SNMP_variable(packet, dataLen)) == 0)
      return;
    ADJUST_VARS(packet,dataLen,itemLen);
    i++;
  }
}

/* Print an SNMP variable and value.  Returns the length (including the
 * type and length fields) or 0 on error.
 */
static int Print_SNMP_variable(packet, dataLen)
     unsigned char  *packet;
     int            dataLen;
{
  int varLen;
  unsigned int u;
```

Continued



12 Tape Autochanger For Unattended Backup!

Herstal's DAT Autochanger provides up to 96 Gigabytes of **Unattended Backup** so you can enjoy a good night's sleep without worrying about who or what is backing up your data.

Available as an upgrade to your existing HP DDS drive, or as a subsystem containing HP's new 8 GB drive, our Autochanger is the perfect solution for your backup needs.

HERSTAL

3171 W. Twelve Mile Road
Berkley, MI 48072-1339, USA
Phone: (313) 548-2001
Fax: (313) 548-2010

CIRCLE 04 ON READER CARD

An SNMP Packet Decoder continued

```
unsigned char charTemp;

charTemp = *packet++;
u = charTemp;
if (--dataLen <= 0) {
  printf("\t%s\n",noMoreData);
  return 0;
}
if (u != ASN_SEQUENCE) {
  printf("\ttype %d; not 'sequence'\n",u);
  return 0;
}
printf("\t\tASN.1 type info:  0x%x (SEQUENCE)\n",u);

u = Get_ASN1_length(&packet, &varLen); /* Get length of whole variable  */
printf("\t\tSEQUENCE Length is %d octets\n",varLen);

varLen += (u + 1); /* Account for the length & type */

dataLen -= u;

if (dataLen <= 0) {
  printf("\t%s\n",noMoreData);
  return 0;
}
printf("\n\t\tVariable:\n");
printf("\t\t---------\n");
if ((u = Print_ASN1("\tVariable: ", packet, dataLen)) == 0) /* variable object id */
  return 0;
printf("\n");

packet += u;
dataLen -= u;
if (dataLen <= 0) {
  printf("\t%s\n",noMoreData);
  return 0;
}
printf("\t\tValue:\n");
printf("\t\t------\n");

if ((u = Print_ASN1("\tValue: ", packet, dataLen)) == 0) /* variable value */
  return 0;
printf("\n");

return varLen;                    /* Return overall length */
```

Continued

An SNMP Packet Decoder continued

```
}

/* Prints a single ASN.1 thing.  Returns the length (including the type
 * and length fields) or 0 on error.
 */

static int Print_ASN1(str, packet, dataLen)
     char           *str;            /* Header string to use       */
     unsigned char  *packet;         /* Pointer to the ASN.1 thing */
     int            dataLen;         /* Remaining data length      */
{
  unsigned char type;
  unsigned char obj_var;
  int itemLen,jtemLen;
  unsigned char  *cp,*ap;
  unsigned long u;
  unsigned char charTemp;
  unsigned long longTemp;

  cp = packet;
  type = *cp++;
  printf("\t\tASN.1 type info: 0x%x\n",type);

  if (--dataLen <= 0) {               /* Is there anything to parse? */
    printf("\t%s\n",noMoreData);
    return 0;
  }
  dataLen -= Get_ASN1_length(&cp, &itemLen);

  /* Make sure we have all the packet we need
   */
  if (dataLen <= 0 || itemLen > dataLen) {
    printf("\t%s\n",noMoreData);
    return 0;
  }

  ap=cp; jtemLen=itemLen;

  switch (type) {
  case ASN_INT:
    printf("\t%sINTEGER (Type is 0x%x, Length is %u octets) Value: 0x",
               str, type, itemLen);

  process_integer:
```

Continued

An SNMP Packet Decoder continued

```
    while (itemLen-- > 0) {
      charTemp=*cp++;
      printf("%02x", charTemp);
    }
    printf("\n");
    PktDataDump(ap,jtemLen);
    break;

  case ASN_STRING:
    printf("\t%sSTRING (Type is 0x%x, Length is %u octets) Value: \"",
              str, type, itemLen);
    while (itemLen-- > 0) {       /* if the character is printable  */
      if (isprint(*cp))           /* then print it, otherwise print */
            printf("%c",*cp++);   /* a space                        */
      else {
            printf(" ");
            *cp++;
      }
    }
    printf("\"\n");
    PktDataDump(ap,jtemLen);
    break;

  case ASN_NULL:
    printf("\t%sNULL (Type is 0x%x, Length is %u octets)\n",
              str, type, itemLen);
    cp += itemLen;
    PktDataDump(ap,jtemLen);
    break;

  case ASN_OBJECT:
    printf("\t%sOBJECT (Type is 0x%x, Length is %u octets) Value: ",
              str, type, itemLen);
    if (itemLen) {
      /* Hack encoding for first byte */
      obj_var = *cp % 40;
      printf("%u %u ", (*cp-obj_var)/40, obj_var);
      itemLen--; cp++;
    }
    while (itemLen-- > 0) {
      charTemp=*cp;
      u = (charTemp & 0x7F); /* Get the first byte     */
      while ((*cp++ & 0x80) && (itemLen-- > 0)) {   /* Is there more?        */
            u <<= 7; /* Shift 1st 7 bits left     */
            u |= (*cp & 0x7F); /* and OR in the next chunk. */
```

Continued

An SNMP Packet Decoder continued

```
        }
        printf("%lu ", u);
      }
      printf("\n");
      PktDataDump(ap,itemLen);
      break;

    case ASN_SEQUENCE:
      printf("\t%sSEQUENCE (Type is 0x%x, Length is %u octets)\n",
                str, type, itemLen);
      PktDataDump(ap,itemLen);
      cp += itemLen;
      break;

    case ASN_IP_ADDR:
      memcpy(&longTemp, cp, sizeof(long));
      printf("\t%sIP ADDRESS (Type is 0x%x, Length is %u octets) Value: %s\n",
                str, type, itemLen,unparse_ip(longTemp));
      cp += itemLen;
      PktDataDump(ap,itemLen);
      break;

    case ASN_COUNTER:
      printf("\t%sCOUNTER (Type is 0x%x, Length is %u octets)  Value: 0x",
                str, type, itemLen);
      goto process_integer;

    case ASN_GAUGE:
      printf("\t%sGAUGE (Type is 0x%x, Length is %u octets)  Value: 0x",
                str, type, itemLen);
      goto process_integer;

    case ASN_TIMETICKS:
      printf("\t%sTIMETICKS (Type is 0x%x, Length is %u octets)  Value: 0x",
                str, type, itemLen);
      goto process_integer;

    case ASN_OPAQUE:
      printf("\t%sOPAQUE (Type is 0x%x, Length is %u octets)\n",
                str, type, itemLen);
      PktDataDump(ap,itemLen);
      cp += itemLen;                          /* Skip over it */
      break;

    default:
```

Continued

An SNMP Packet Decoder continued

```
    printf("\t%sUNKNOWN (Type is 0x%x, Length is %u octets)\n",
              str, type, itemLen);
    PktDataDump(ap,jtemLen);
    cp += itemLen;                          /* Try to skip over it */
    break;
  }
  return cp - packet;
}

/* Parse awkward additive length encoding, leave pointer at 1st byte after it
 */
static int Get_ASN1_length(pp, ip)
     register unsigned char **pp;    /* Pointer to pointer to packet    */
     register int           *ip;    /* pointer to int (returns length) */
{
  unsigned int    i, itemLen;
  unsigned char   charTemp;

  printf("\t\t\tASN.1 length info:\n");

  charTemp = *(*pp)++;
  i = (unsigned int) charTemp;    /* Get the first byte */

  printf("\t\t\t\tOctet 1: 0x%x\n",charTemp);
  if (!(i & 0x80)) {              /* Is it multi-byte form? */
    *ip = i & 0x7F;               /* NO: return the answer... */
    printf("\t\t\t\t\tSingle-octet form.\n");
    printf("\t\t\t\t\tLength encoded in 1 octet\n");
    printf("\t\t\t\t\tLength = 0x%x & 0x7F = 0x%x\n",i,*ip);
    return 1;
  }

  printf("\t\t\t\tMultiple octet form.\n");

  i &= ~0x80;             /* Clear the flag bit... */

  if (i == 0) {           /* Is it the definite form? */
    printf("Get_ASN1_length: indefinite form found!\n");
    printf("Get_ASN1_length: SNMP does not allow the indefinite form!\n");
    exit(1);
  }

  itemLen = i + 1;                /* Save the actual length */
  printf("\t\t\t\t\tLength encoded in %d octets\n",itemLen);
```

Continued

An SNMP Packet Decoder continued

```
    for (*ip = 0; i; i--) {          /* Count up the integer */
      int j = 2;
      *ip <<= 8;                     /* Multiply by 256 */
      charTemp = *(*pp)++;
      printf("\t\t\t\tOctet %d: 0x%x\n",j,charTemp);
      *ip += (unsigned int) charTemp; /* Add in the next byte */
    }

    printf("\t\t\t\t\tLength = %d (0x%x)\n",*ip,*ip);

    return itemLen;                  /* Return number of bytes */
}

static char *unparse_ip(ipaddr)
     unsigned int ipaddr;
{
    int ipbuf[4], i;

    for (i=0; i < 4; i++) {
      ipbuf[i] = ipaddr & 0xFF;
      ipaddr = ipaddr >> 8;
    }

    sprintf(ip_out, "%d.%d.%d.%d", ipbuf[3], ipbuf[2], ipbuf[1], ipbuf[0]);
    return(ip_out);
}

main(void)
{
    unsigned char buffer[1024];
    unsigned int k, i=0;

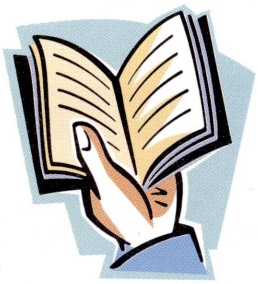
    (void)memset((void *)buffer,(int)0,1024*sizeof(char));

    while(scanf("%x",&k) != EOF) {
      buffer[i] = (unsigned char)k;
      i++;
    }

    i++;

    Decode_SNMP_Message(buffer, i);

    exit(0);
}
```



Book Review

by Chris Curtin

HAVE YOU EVER WANTED a UNIX reference that was easy to read and understand and did not treat you like a child? How about a reference that touches all corners of using UNIX, including the areas that you are supposed to be born knowing? Well, *UNIX Power Tools* provides all this and more.

A small volume, relative to the amount of information it contains, the 1,119-page text is full of tips for both the newest users of UNIX and the experts who have been using UNIX for over a decade. Simple concepts are explained (a good section on more(1)) and there are also seriously in-depth discussions of vi(1), find(1), and regular expressions.

The book has three main authors: Peek, O'Reilly, and Loukides. They have combined text from README files, Nutshell books, and Usenet postings from 32 other contributors. The list of contributors reads like a who's-who of the Usenet: Chris Torek, Gene Spafford, and Jonathan I. Kamens are just a few.

When I started flipping through the book, the first thing I noticed was the layout. Each section is numbered, concise, and short. The longest is about two pages. Another stand-out is the large number of cross-references. There are two interesting symbols that are used throughout the text: the Screw Icon and the Bomb.

The Screw Icon indicates that you should, as the authors say, "Be careful with this feature, or you might get screwed." The Bomb indicates that another section describes problems you may encounter using the tip. As the authors put it: "You can think of a bomb as a cross-referenced screw." These two symbols provide a pretty accurate introduction to the light-hearted approach this book takes.

As I said earlier, this book has an incredible cross-reference system. Using different fonts and colors, any program mentioned in an article is given a cross-reference to another section or sections that contain a more detailed description of the program. Think of it as a hypertext book.

Okay, so what is in the book? Lots! There are 55 chapters divided into nine sections. Each chapter contains several articles, each by a different person. Each article presents a single issue and does it fairly well.

Title	UNIX Power Tools
Authors	Jerry Peek, Tim O'Reilly, and Mike Loukides
Publisher	O'Reilly & Associates/Bantam
	March 1993, 1,119 Pages
	ISBN: 0-553-35402-7
Price	$59.95

The nine sections are:

- Making Yourself at Home
- Let the Computer Do the Dirty Work
- Working with the File System
- Looking Inside Files
- Text Editing
- Managing Processes
- Terminals and Printers
- Shell Programming
- Miscellaneous

Chapter 1 gives the generic introduction to UNIX found in most other UNIX reference books. However, the section is well defined and contains many cross-references to advanced topics later in the book.

The introduction to Part 1 says it best: "Do us a favor. Don't keep reading. Instead start browsing." This book is definitely not one that you want to sit down and read from cover to cover. You would quickly get bored. Instead look at the Table of Contents, pick a chapter with an interesting title, and look through it.

Each section also has an interesting title, is easy to read, and can be understood in a few minutes. Try the suggestions; if you can do damage with the tip, they will clearly state so in the section.

While it is a unique way of writing a book, the multiple authors with multiple writing styles can be cumbersome at times. Some information is split between different sections, sometimes hundreds of pages apart. The biases of each author are evident and sometimes they contradict each other on religious issues. On technical issues they present a united front and state why they do or do not recommend something.

The book also comes with a CD-ROM. The CD-ROM has source and executables for more than 60 scripts and programs. There are precompiled binaries for the HP 9000 Series 700 on HP-UX 8.07. It also has binaries for SCO and several other popular UNIX systems.

The bulk of the GNU software is included. GNU Bash, GNU Emacs 18.58, GNU Awk, GNU groff, and GNU tar are the main programs and other GNU utilities are also included. Perl 4.035 is included as is path 2.0.12u7. The CD-ROM is especially useful for those of us who do not have ftp access and cannot download programs from a server.

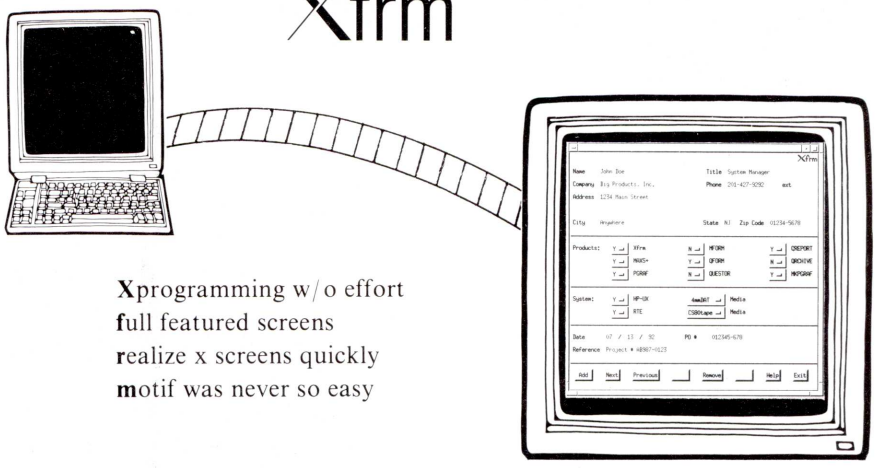
My co-workers and I have loaded several of the scripts and programs onto our HP 9000/827 and have had no problems running the code compiled for the 700 Series. You also have sources for all the programs if something does not compile or acts strangely on your system.

While I have not read the entire book (after all, it is 1,119 pages!), the sections I have read are superior to anything I have seen in a long time. I have already incorporated several of the tips into my shell and use them daily. I can highly recommend this book to anyone who is learning UNIX and does not have a guru to watch and ask questions of, and to the user who already has a strong background in UNIX and wants to learn more. The gurus of gurus are the authors of this book, so there is something for everyone. ◧

Chris Curtin is a software developer for Bradley Ward, Inc. in Atlanta, Georgia. He specializes in device drivers for factory automation on the HP 9000. He can be reached by e-mail at chris@bwilab3.atl.ga.us.

X11/Motif Screen Programmer's Utility

Xfrm



Xprogramming w/o effort
full featured screens
realize x screens quickly
motif was never so easy

COMBS INTERNATIONAL, INC.
886 Belmont Avenue, Suite 3
North Haledon, NJ 07508
201-427-9292
201-427-3428 FAX
Internet: rcc @ combsint. Att: Mail Com.

CIRCLE 07 ON READER CARD

DEVICE AND FILE SYSTEM SWAP

REBECCA COGGINS PROPST

On my system I am using a mixture of device and file system swap. How does this affect system performance?

To understand how performance is affected when using both device and file system swap it is important to understand the differences between the two.

Device swap space occupies a disk or section of a disk reserved exclusively for swapping. It resides in its own reserved area and is not taken from file system space. The amount of device swap on a disk is static and can be changed only if the disk is reconfigured.

File system swap allows a process to swap to space in the file system currently not being used to store data. It is limited by the amount of free disk space in the file system and the restrictions placed on it by the system administrator. The amount of space available can easily be reconfigured by the system administrator by modifying /etc/checklist and rebooting the system.

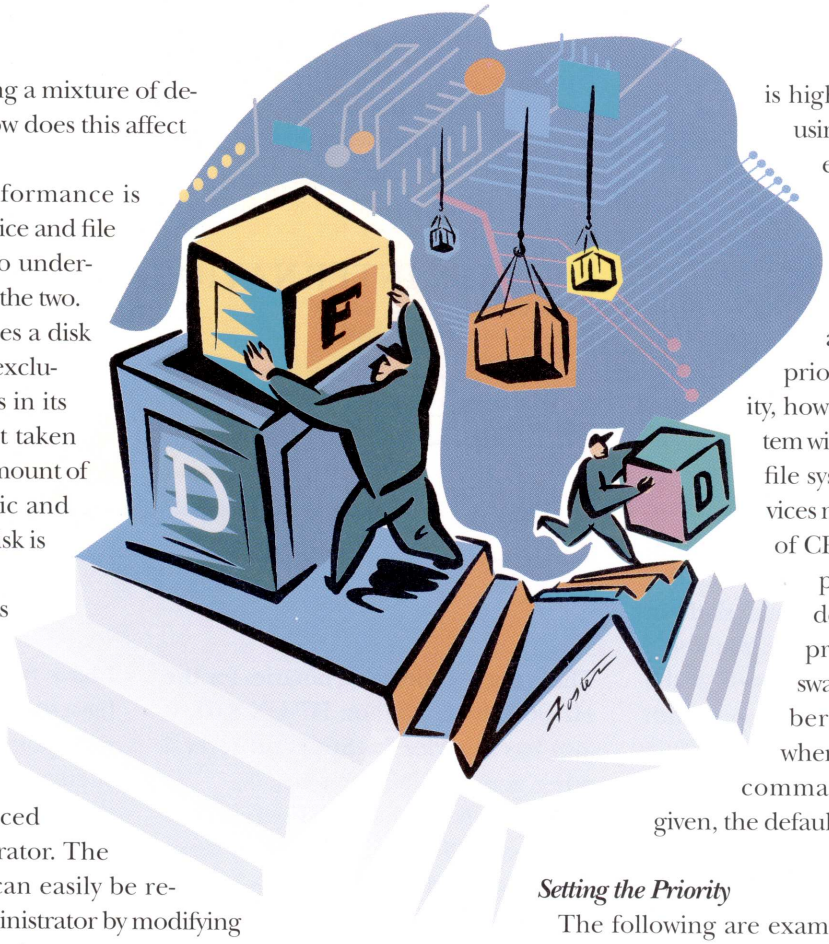


Illustration by Matt Foster

Device is Faster

Device swap is faster than file system swap. One reason is that you can write an entire request in contiguous blocks to a device. File system swap cannot guarantee it will write to the disk in contiguous blocks. Also file system swap must be done in file system blocks, which are typically 8-KB blocks. Device swap can write to the disk in 64-KB blocks for a Series 300/400 or 256-KB blocks for a Series 600/800. The ability to write in larger contiguous blocks allows device swap to take less time for data to be retrieved from or restored to the system because it typically does fewer seeks.

If you have additional devices that can be used for swapping, enable these before file system swap, because the performance is higher. You can do this by using the priority option in either swapon(1m) or the priority options field in /etc/checklist.

Swapping rotates among both devices and file systems of equal priority. Given equal priority, however, the operating system will use device swap before file system swap because devices make more efficient use of CPU time. But it is good practice to ensure that device swap has a higher priority than file system swap (that is, a lower number in the pri argument when executing the swapon command). If no priority is given, the default is 1.

Setting the Priority

The following are examples that show how to set the priority of device swap in /etc/checklist and using swapon(1M):

1. An example using /etc/checklist

```
/dev/dsk/c0d0s10 /swap swap pri=1 0 0 # device swap area
/dev/dsk/c0d0s14 /users swapfs
   min=625,lim=1250,res=0,pri=2 0 0 \
                    # file system swap area
```

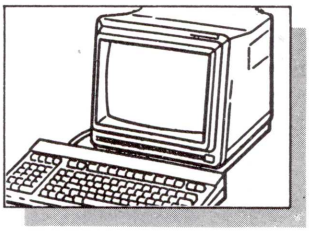
- First field: The block device file corresponding to the disk used for swapping.
- Second field: The directory with which the swap area is associated. For device swap it is just a place holder. For file

COMING IN FUTURE ISSUES OF *hp-ux/usr*

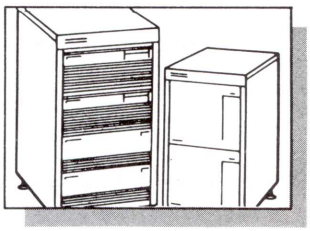
- Multi-Media Workstations
- Using HP's Eloquence
- CA-Unicenter Review
- Awk Programming

OUR 13th YEAR

QUALITY HP EQUIPMENT WITHOUT THE HP PRICE



DON'T UPGRADE YOUR HP SYSTEM UNTIL YOU GET A SECOND OPINION FROM THE SECOND SOURCE FOR HEWLETT-PACKARD 1000-3000-9000 EQUIPMENT

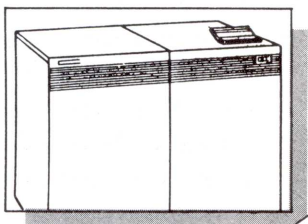


Consult with us about cost-saving alternatives

- Complete Configurations
- Individual CPUs-Peripherals
- Memory Upgrades and Feature Enhancements
- Classic and Spectrum Equipment

WE BUY
Highest Prices Paid

WE SELL
*All Items Sold Are Guaranteed for HP Maintenance
*Short and Long Term Leases Available



WE TRADE
Over 1000 satisfied Hewlett-Packard users are our customer references throughout the United States, Canada, Europe, and the Far East.

C.S.U. Industries, Inc.
207 Rockaway Turnpike, Lawrence, NY 11559
Ask for Mordi: (516) 239-4310 FAX (516) 239-8374

OUR 13th YEAR

CIRCLE 18 ON READER CARD

system swap it is the mount point directory for the file system. This is a necessary field.

- Third field: The type of the entry, which is swap for device swap and swapfs for file system swap.
- Fourth field: The options field for swap. The min option is the number of file system blocks that are taken from the file system. The lim option is the maximum number of file system blocks the swap system is allowed to take from the file system. The res option is the number of file system blocks that are reserved for file system use only. The pri option is the priority, which is indicated by pri=n where n is between 0 and 10. The default for priority is 1. If no option is needed use "defaults" as a place holder. For more information about this field see swapon(1M).
- Fifth and sixth fields: A place holder of 0 for both fields; they do not have meaning but should exist.
- Seventh field: A comment preceded by the # character.

2. An example of using swapon(1m).

a. Device swap

```
/etc/swapon /dev/dsk/c0d0s10 -p 1
```

b. File system swap

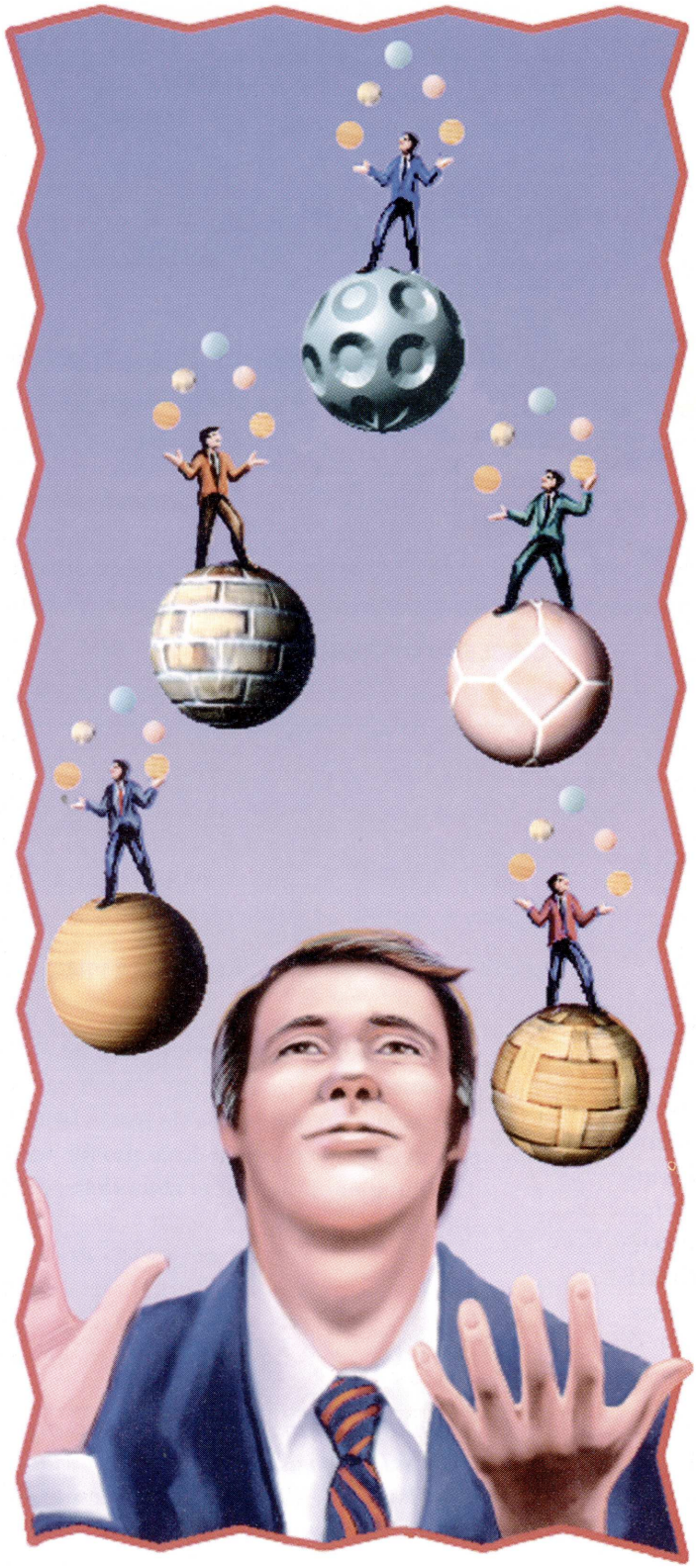
```
/etc/swapon -m 1000 -l 5000 -r 10000 -p 2 /users
```

Where the options have the following meaning:

-p	Priority
-m	The number of file system blocks taken from the file system
-l	The maximum number of file system blocks the swap system is allowed to take from the file system
-r	The number of file system blocks reserved for file use only ◧

Rebecca Coggins Propst is an HP Response Center engineer working on the System Datacom Team. She has been with HP for the last four years. Previously she worked for Lockheed Georgia as a software developer for manufacturing processes.

HP-UX



SYSTEMS

OVER TIME, THE TERM "DATA CENTER" HAS COME TO MEAN THE CENTRALIZING OF DATA PROCESSING EQUIPMENT AND HUMAN MIS RESOURCES IN A COMMON LOCATION. IN THE 1990S, NEW CONCEPTS OF COMPUTING SUCH AS COOPERATIVE COMPUTING AND CLIENT-SERVER COMPUTING ARE EMERGING. SYSTEM MANAGERS ARE CHALLENGED WITH THE TASK OF INTEGRATING THESE NEW CONCEPTS INTO THEIR ENVIRONMENT. THESE SYSTEM ADMINISTRATORS WILL BE REQUIRED TO MANAGE COMPLEX, NETWORKED, HETEROGENEOUS SYSTEMS WITH THE SAME LEVEL OF SERVICE AND COST-EFFECTIVENESS AS ON THEIR EXISTING SYSTEMS.

By Craig Ledo

ILLUSTRATED BY CHARLES WALTMIRE

MANAGEMENT SOLUTIONS

System and Network Management Requirements



Growing numbers of computers are interconnected through local and wide area networks that span the globe. System managers are demanding that these complex networks remain transparent to end users and manageable by administrators. At the same time, it is becoming more expensive to manage the data center. Increasing human expertise is needed to manage the wide variety of systems, networks, and applications. As companies are being asked to trim operating expenses, they are looking to reduce the overhead of their systems management operations staff. Solutions that automate systems management operations are a requirement in these data centers.

In addition to these challenges, MIS directors and EDP managers are increasingly concerned about managing their data center environments. HP surveyed these managers to understand their goals for improved systems and network management solutions. These goals are detailed as follows:



- Increased system availability
- Centrally managed resources
- Secure information services
- Decreased training requirements
- Fairly allocated costs
- Reduced computer room staffing

HP is committed to industry standards and was one of the first vendors to model its system and network management applications according to the International Standards Organization (ISO) Open System Interconnect (OSI) model.

The OSI model provides a framework for system and network management. This model defines five specific areas for management:

- PERFORMANCE provides control and tuning of systems resources for monitoring satisfactory service levels and provides planning for future system resource needs.
- CONFIGURATION controls systems and network device configurations.
- ACCOUNTING tracks system resource utilization.
- SECURITY defines how to protect the system and the network and its components from unauthorized intrusion or surveillance.
- FAULT (System Availability) provides the ability to identify, diagnose, and recover from system and network problems quickly.

HP has defined two additional categories for managing systems:

- OPERATIONS CONTROL is concerned with managing both output (for example, printer spooling) and jobs.
- STORAGE MANAGEMENT includes both disk and tape management as well as backup and recovery tools.

HP'S Systems and Network Management Strategy

As computing environments are changing from traditional stand-alone systems to complex networks of distributed systems, it is important that the networks be managed as if they were a single system. HP recognized this trend and developed a strategy to incorporate systems and network management applications under a common platform. This integrated platform, called HP OpenView, is HP's umbrella for enterprisewide resource management. HP OpenView's architecture is open, standards-based, distributed, and scalable.



OSF selected HP OpenView (September 1991) as fundamental components of DME. In addition, the HP Network License System (NetLS) and Software Distribution Utilities were selected as part of DME. HP OpenView allows for the integration of both HP and independent software supplier system management applications. Today's HP OpenView products allow a single administrator to manage the wide variety of systems and networks that exist across a corporation from a single location.

HP OpenView Network Management Server

This is the core of the DME framework. It includes HP OpenView Windows,

an advanced graphical user interface that employs OSF/Motif and X Windows to provide consistent user interaction with management applications and the managed environment. It provides common, developer-configurable, pull-down menus and topology maps to simplify navigation through complex computer environments. In addition, the HP OpenView Communications Infrastructure provides location-transparent communication between applications, managed objects, and managed services in a distributed management environment.

Network License System (NetLS)

This is a software toolkit that manages, enforces, and monitors software using policies across different systems.

Software Distribution Utilities

These are a set of sophisticated tools that install and update system and application software from a single location.

In addition, OSF selected the Palladium Toolkit Version 2 as the enabling technology for print services. HP OpenSpool is the only print service application that is based on the Palladium technology (Version 1).

The additional technology selected as part of DME will be incorporated into HP's systems and network management strategy as it becomes available from OSF. With HP OpenView as the core of DME, HP provides the fastest and smoothest path to DME.

The HP OpenView platform will provide the framework for integration of all applications, including those provided by HP's Channel Partners.

HP OpenView OperationsCenter

Managing, monitoring, and controlling large multivendor distributed computing environments require that new capabilities, techniques, and management concepts be used in IT organizations. The people responsible for these activities can't afford to wait for user complaints or to monitor personally all systems and applications. HP OpenView OperationsCenter will provide the key to efficient operations through centralization, integration, and automation of these management activities. The OperationsCenter increases the IT organization's effectiveness and productivity by increasing the uptime of the distributed systems and decreasing the time to resolve problems.

The Center collects management information, messages, and monitoring alerts from throughout the computing environment, then prepares, consolidates, and presents the information at the central management system. Once the management information is received, OperationsCenter can initiate corrective actions immediately and also provide guidance for further problem resolution. All management information and records of associated actions are placed in a central repository for future analysis and audit.

HP OpenView OperationsCenter's configuration flexibility meets the requirements of the IT organization and the needs of all its users. It can easily be tailored to fulfill every information requirement and provide management capabilities specific for each user. Additionally, management activities addressed by OperationsCenter can be expanded quickly by integrating other management applications.

The center will run on top of the HP OpenView Distributed Management Platform, which allows you to add other HP OpenView applications to address management tasks.

Performance Management

This area of Systems Management Services is concerned with managing the performance of both stand-alone and networked systems.

Managing and optimizing the performance of large computing systems has always been a great challenge for system administrators. With the growing trend towards distributed computing and OLTP-type operations, better utilization of these computer systems has become crucial for the success of the enterprise.

HP's family of easy-to-use UNIX performance tools is targeted at system administrators, data processing managers, and management information system managers. The tools are particularly important for environments experiencing performance problems that detract from user productivity, or environments that need information to support business decisions about future systems requirements.

HP-UX provides several standard performance commands that are shipped as part of the HP-UX operating system (sar, vmsat, iostat, etc). These commands can be used locally or accessed across the local or wide-area network via remote login (rlogin).

In addition to the standard commands, HP offers industry-leading performance solutions called HP GlancePlus/UX, LaserRX/UX, HP RXForecast/UX, HP PerfView and HP PerfRX. HP also provides performance consulting available through the HP Professional Services Organization. The services include analyzing current system performance, defining recommendations to improve system performance, defining performance-oriented system

management practices, and planning for system and business change and growth. In addition, System Utilization Services that provide reports of the current system resource utilization are available, either at a global level or user application level.

Operations Control

This area of Systems Management Services is concerned with managing system operations. Typical tasks performed in this area include output spooling and production scheduling. Although the UNIX operating system offers scripts and commands to perform these tasks, HP recognizes the need for prepackaged, easy-to-use, and easy-to-administer solutions.

Output Spooling

HP OpenSpool brings commercial, standards-based spooling capabilities to UNIX.

Production Scheduling

Production scheduling (also called job management) tools allow administrators to manage system resources better, thus improving the overall utilization and productivity of their systems. HP-UX currently offers the standard UNIX job scheduling commands (cron, at).

System administrators can control the disk space utilization of users by using disk quotas, a standard part of HP-UX. This provides a mechanism for controlling and reporting user utilization of disk space.

To meet the needs of data center managers, HP has been working closely with independent software suppliers to provide more robust production scheduling and job management solutions for HP-UX. The independent software solutions for job scheduling allow managers to prioritize and schedule better the resources of the system. AIM Technology, SCH, Unisystems, and Unison Software are examples of vendors that offer job scheduling solutions for the HP 9000 family.

Load Balancing

HP Task Broker provides automatic distribution of jobs across a network of systems to optimize the use of computing resources. It allows you to take advantage of computing resources in your network that are not being fully utilized.

Storage Management

Information is one of the most important assets of a company. Therefore, availability of data and protection against data loss are among the most critical issues system managers address. These features are more and more important as data is spread out across a heterogeneous network. This area of the Systems Management services describes the storage management solutions, including backup, disk, and tape management.

Backup/restore utilities are required to reduce the system manager's task of archiving data. These utilities provide users with more control over archiving and retrieving of their files. The UNIX operating system provides several general-purpose commands that allow users to back up and restore their data (tar, cpio, dd). In addition to providing these standard UNIX commands, HP provides utilities such as fbackup, HP OmniBack, and HP OmniBack/Turbo.

Backup/Restore

Fbackup/Frestore is a backup tool, integrated with HP-UX. It is targeted for low-end and midrange systems with a small amount of online storage (less than 1 Gbyte). It provides a cost-effective, easy-to-use backup solution.

HP OmniBack is a global network backup management system that provides central backup and recovery. It automates the centralized backup process from any system on the network for all machines.

HP OmniBack/Turbo is a superset of HP OmniBack that provides additional performance for systems with large amounts of online data, especially large databases. It combines network backup capabilities with high-performance local backup (up to 25 Gbytes per hour for certain configurations, or up to 80 times the standard UNIX commands).

Disk Management

HP provides the Logical Volume Manager (LVM), as a standard feature of HP-UX, to expand and enhance the standard UNIX system mechanism for data storage and retrieval. LVM transparently implements virtual disks, which can span multiple physical disk drives. In addition, LVM provides user-definable disk partitions that can be changed dynamically for enhanced usability and efficiency.

HP is also working with strategic independent software suppliers to provide more comprehensive disk management applications.

Tape Management

Tape management applications address aspects of tape usage and tape control. HP-UX currently offers tape management solutions from independent software suppliers like SCH, which provides REELlibrarian, REELbackup, and REELexchange; and Raxco, which provides Backup.UNET.

Storage management applications provided by both HP and independent software suppliers will continue to evolve on the Series 800 business servers. The storage management plans for 1993 are to provide an integrated

storage management product family (backup, archive, and hierarchical storage management), and to support files and databases.

Configuration Management

Many of the traditional "system administration" tasks, which have evolved since the early days of the UNIX operating system, are part of the configuration area of Systems Management Services. The specific areas of interest for HP-UX include Installation and Update, System Configuration, Network Configuration Management, and PC Management.

Installation and Update Management

Installation and update of both system and application software for the Series 800 Business Servers is accomplished with a solution called HP Software Distributor.

HP Software Distributor is a full set of tools that perform distributed installation, update, and removal of software across the network. It provides a central management organization and industry-standard capability for single-point software distribution that reduces costs, improves service levels, and remains flexible enough to support unique software distribution policies.

System Configuration

System Administration Manager (SAM), shipped as part of the HP-UX operating system, is a menu-driven, screen-oriented program that enables system managers to perform system administration tasks without having or acquiring specialized knowledge of HP-UX.

Network Configuration and Management

HP OpenView is an open and modular distributed management solution. It provides a model for creation of object-oriented solutions. Many system administrators need the capability to manage several networked systems. HP OpenView Network Node Manager provides fault, performance, and configuration management for multivendor TCP/IP networks. HP NetLS allows application vendors and end users to take advantage of a wide variety of license models to reflect application usage and value more accurately.

PC Management

The HP NewWave environment is an easy-to-use, intuitive graphical software environment for integrating PC applications. It provides transparent access to corporate information systems. HP NewWave Office System services allow system managers to distribute PC software products and provide version control from a central HP-UX location. HP OmniBack (with Quest's Plan-B software), will allow a system manager to back up centrally LAN Manager/X or NetWare PCs running DOS, OS/2, or UNIX.

With HP LAN Manager/X, users can have the best of both worlds—access to a wealth of PC applications plus access to the power, resources, and security of HP-UX.

HP NetWare/9000 provides MS-DOS, OS/2, and Macintosh clients with full support for existing PC server functionality and PC networking applications.

If your network includes Apple Macintosh PCs, Pacer Software offers PacerShare, PacerPrint, and PacerLink. This enables the Series 800 systems to operate as file and print servers and gives Macintosh users access to host applications using terminal emulation.

HP Software Vendor provides a means of centrally controlling and distributing PC applications in a LAN environment. It provides automated, centralized PC application installation, automated software updates, and software license tracking and enforcement across a network.

HP-UX today provides many solutions in the area of system configuration and HP will continue to enhance these products as UNIX computing environments evolve.

Accounting Management

An accounting chargeback management system tracks computer usage, analyzes that usage, and provides comprehensive chargeback reporting.

HP-UX currently provides the standard UNIX accounting tools (both C programs and shell procedures) that can be used to build accounting systems. These tools perform process, connect time, and disk usage accounting. Disk Quotas, which is used to limit the disk space usage of users on a per file system basis, is standard with HP-UX. It provides the system administrator the ability to limit the users' disk consumption. This functionality is often asked for in conjunction with the system accounting commands.

Several independent software suppliers, such as AIM, OCS, and Uni-Solutions, have built on top of these tools and provide off-the-shelf solutions that can generate charge-back information. These solutions are described in the *HP-UX Software Catalogue.*

HP will continue working with independent software suppliers to provide solutions for system accounting. These

independent software suppliers will be encouraged to use the HP OpenView platform for the development of their applications.

Security

Information stored in computers as data is a vital resource in businesses today.

HP recognizes the importance of security in commercial UNIX application environments and has made system security an integral part of the operating system. The HP implementation of system security is designed to exceed the Department of Defense "Orange Book" requirements for a C2 level of trust.

For higher level security requirements, a special version of HP-UX called HP-UX B-Level Security (BLS) is available. HP-UX BLS addresses the more complex "multi-level" security needs typical in federal government and defense-related communities that process sensitive information.

Independent software supplier security software products can offer complementary security functionality to that already provided by HP-UX. These products are designed to identify security violations and security problems in the UNIX operating environment. They include Raxco's Security Toolkit and DEMAX's SecureMax.

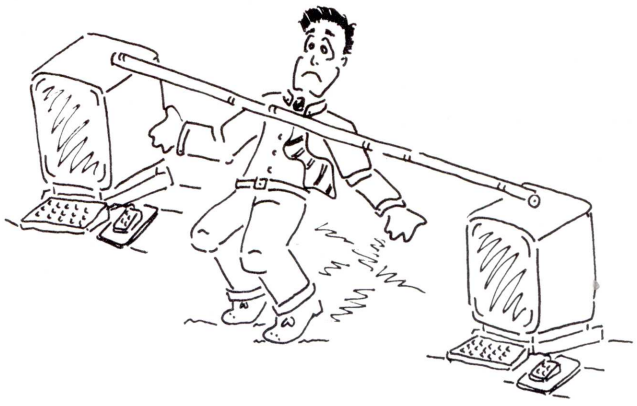
HP-UX will continue to provide enhanced commercial security. In addition, security solutions available through OSF/DCE will be incorporated within HP-UX.

System Availability

This area of the Systems Management Services details the high availability solutions for HP-UX. By investing in highly available systems, companies are able to

Now Offering HP Apollo Series 700 Workstations

Low Budget Got You In Limbo?



Rent from Genstar for a Flexible Solution

Stretch your limited capital by expensing the HP, Sun, Tadpole and BriteLite equipment you need.

Smart managers know renting frequently offers more advantages than buying capital equipment. You can customize a rental at Genstar — all from an industry leader for more than 25 years.

Now you can easily do what you need to do and stay under budget. Call Genstar for overnight delivery.

U.S. 1-800-422-3300
Canada 1-800-387-6646

HEWLETT PACKARD Channel Partner

GENSTAR RENTALS
What you need when you need it

PCs, Workstations & Electronic Test Equipment for Business

significantly reduce the enormous costs associated with system downtime, increase the productivity of their work force, and differentiate themselves as providers of superior highly available services. Furthermore, the growing number of large database applications running in OLTP-type environments challenges computer vendors to provide systems that ensure absolute data availability.

HP is uniquely positioned in the UNIX market today as a provider of a broad number of highly available solutions, from industry-leading reliable systems to the HP 9000 Series 1200 fault-tolerant systems.

Highly Reliable Systems

HP is continually improving the reliability of its HP 9000 Series 800 Business Servers, with an average Mean Time Between Failure (MTBF) of three years. HP's peripherals have an average MTBF of 12 years. HP is currently leading the industry in hardware reliability with the HP 9000 Series 800 business server family.

Highly Available Systems

HP also provides products for environments that require additional system availability. HP's Battery Backup/Power Fail eliminates loss of data as a result of power interruptions, and automatically restarts operation after power is restored. An Uninterruptible Power Supply (UPS) also is available. UPS systems provide a constant flow of refined, regulated, computer-grade power through disturbances such as power blackouts, brownouts, surges, and power spikes.

HP Disk Arrays in high availability mode utilize a Redundant Array of Inexpensive Disks (RAID) with one disk designated as the parity disk for data protection. HP's high availability disk array offers a RAID level 3 mode of operation.

HP MirrorDisk/UX, disk mirroring software, further expands data availability by preventing data loss due to disk failures by maintaining up to three copies of data on separate disks. This means data is still accessible after any single disk failure. HP MirrorDisk/UX offers additional data protection over disk arrays, in that all cables, interface cards, power supplies, and controllers are duplicated.

HP SwitchOver/UX provides nearly continuous operation of your mission-critical systems by significantly decreasing downtime due to system hardware or software failures. It detects system failures and provides for automatic switchover between a primary and standby processor.

Fault management tools monitor the system and network to identify and diagnose problems to maximize system and network availability. These tools isolate, diagnose, resolve, and log system and network problems on a real-time basis.

HP Support Wave is an integrated support tool platform that provides a single point of access to diagnostics, verifiers, exercisers, and expert troubleshooting utilities.

HP Support Watch software helps ensure high system uptime. Support Watch software catches problems before they occur, transforming unplanned downtime into scheduled maintenance.

HP will continue to evolve both the high availability and fault management solutions available on HP-UX. The future direction for this high availability program is to provide greater transparency and to reduce recovery time.

HP Channel Partner Solutions

HP is also partnering with leading independent software suppliers to enhance its offering further. These new products will augment the many solutions already available.

One leading supplier is Computer Associates International Inc. (CA)—the world's largest independent vendor of mainframe, midrange, and desktop software. CA provides CA-UNICENTER solutions on HP 9000 Series 800 business servers.

CA-UNICENTER includes storage management, production control, data center management, performance management, and system security solutions. HP is the first UNIX system platform for which CA is providing systems management solutions.

HP also is CA's reference port for all ongoing CA-UNICENTER development.

In January 1993, HP and Tivoli Systems, Inc. jointly announced availability of the Tivoli Management Environment (TME) for distributed system management on the HP S700 and S800 systems. Tivoli Systems is a leading provider of distributed systems management solutions, and, along with HP, a key contributor to OSF's Distributed Management Environment. Tivoli has built significant market awareness with its position as a pioneer of object-oriented technology for managing distributed computing environments.

In February 1993, Legent Corp. and HP announced the formation of a strategic relationship designed to offer enterprisewide application management solutions. With this announcement, Legent will port its software management product family, Endevor, to the HP 9000 Series 800. Legent and HP will also collaborate to integrate Endevor with HP's SoftBench, the de facto industry-standard software development framework.

Systems and Network Management Summary

Systems and network management functionality is critical to the success of the UNIX operating system in the data center. HP's system availability products allow you to evaluate costs associated with system downtime, and choose the solution that best meets your needs. HP provides UNIX performance management tools specially designed to increase the utilization of existing computer systems. HP's security functionality goes beyond standard requirements, offering you a secure commercial environment. HP 9000 systems also improve the utilization of networked computing environments by productively managing output spooling and effectively backing up large storage.

HP's solutions will help data center managers reduce their computer room staffing, centrally manage their resources, and decrease their training requirements.

As systems and network management solutions move to the HP OpenView environment, MIS managers will have the industry-leading solution for integrated, standards-based, enterprisewide systems and network management. ◧

During his nine years with HP, Craig Ledo has held various positions including HP-UX software support engineer, sales development engineer/competitive analyst, and HP-UX software development engineer. He is now the product manager for HP-UX Systems Management and High-Availability Solutions.

HP9122C HP9153C Replacements

ISA Floppy Disk Family



ISA 1015
(HP9122C Compatible)
3.5 inch dual
HP-IB SS/80
New Price: $1,300

ISA 2025
(HP9153C Compatible)
40MB with 3.5 inch single
HP-IB CS/80 SS/80

ISA 1060
5.25 inch single
HP-IB SS/80

ISA 1015S *(NEW SCSI)*
3.5 inch
single
(HP internal FD compatible)
SCSI-for HP9000 300/400/700/800
New Price: $950

ISA 1060S *(NEW SCSI)*
5.25 inch single
SCSI-for HP9000 300/400/700/800

• Memory Card • I/F Card • Floppy • Hard Disk • MO Disk • QIC Tape • DAT •

ISA, the Largest HP Enhancements Manufacturer

HEAD OFFICE: ISA CO., LTD. Japan, Sunrise Shinjuku Bldg, 2-4-15 Okubo, Shinjuku-Ku, Tokyo 169 Japan Tel: 03-3208-1150 Fax: 03-3208-1335

USA:	Texas ISA, Inc:	Tel: 713-493-9925	Fax: 713-493-2724
S.E. ASIA:	ISAHK CO., LTD:	Tel: 330-1977	Fax: 330-1077
EUROPE:	EURISA SARL:	Tel: 1-48-61-48-95	Fax: 1-48-61-49-06

CIRCLE 22 ON READER CARD

X-Watch

by Larry Headlund

Tool Control Language

In my columns on WCL, the Widget Creation Library, I mentioned in passing Tcl, John Ousterhout's Tool Command Language. This is time for a more detailed look.

Up Front Warning

While I admire the goals of Tcl and acknowledge its usefulness, there is much in its implementation I deplore. To the Critic's Challenge (All right wise guy, why didn't you write something better yourself?) I can only shuffle my feet and mutter mealy-mouthed excuses. I also seem to be in the minority here. Tcl is being used in a wide variety of projects and is producing impressive results. The references at the end of this column point only to published implementations. There is also a large and growing community of enthusiasts. Those with Internet access should check out *comp. lang. tcl* for late-breaking news.

Why a Tool Control Language?

The Land of Serendip is the home of many good things, particularly for UNIX. When UNIX was being developed, 110- and 300-baud communication was common. As a result, header and footer information in program output was seen as a waste of precious bandwidth in most cases and was included as an option, not as default behavior. This, and the brilliant insight that everything should be treated as a file, led to the output of most programs being suitable as input to another program. Hence redirection, pipes, and all the elegant simplicity of UNIX shell programs. This insight has been elevated to one of Kernighan and Plauger's pithy rules: "A program should say nothing unless and until it has something to say." (Does anyone else get depressed when they go into a bookstore and see hundreds of titles in the computer section but no *Elements of Programming Style*?)

The practice of making the output of one program be the input of another did not translate well to the GUI world. X has cut-and-paste and XSendEvent and for those who turn to the Dark Side there is DLL and OLE, but there has not been a general way for programs to interact. Tcl presents itself as the glue to bind programs together.

What Is Tcl?

On one level Tcl (pronounced tickle) is an embedded language. Not to be confused with embedded programming, which is programs, usually ROMed, in devices like printers and scanners, embedded languages are "little" languages designed to be embedded in larger programs as interpreters. These little languages can be as simple as a command-line option interpreter. Or they can be a full-featured and rich environment like Apple's HyperCard language. The most famous embedded language and perhaps the most widely used programming language in the world is the macro language for Lotus 1-2-3.

The requirements of a general-purpose embedded language are stringent:

- It must be small. The overhead of the embedded language must not overwhelm its parent program. A full C++ interpreter would not be a good candidate for an embedded language!
- It must be fast. If interpreting embedded commands is too slow, hard-coded routines should be used instead.
- If must be complete. Most of the things you want to do, in particular `if... then... else` constructs

Attended Backup:

As much as you'd like to, you can't leave your car while traffic is backed up.

But you can leave the office while your system is backing up—

with reliable, affordable solutions from IEM.

Unattended Backup:

- 4mm, 8mm, QIC
- SCSI & HP-IB
- Standalone drives, autofeeders, and network backup software



IEM manufactures the broadest range of solutions for your backup and data transfer needs.

IEM

One Source, Many Solutions

IEM is the manufacturer of the largest line of HP third-party peripherals.

In the U.S. and Canada:
IEM, Inc., P.O. Box 1889
Fort Collins, CO 80522 USA
Phone: (1) 303-221-3005
(1) 800-321-4671
Fax: (1) 303-221-1909

In the United Kingdom:
IEM Europe, Colorado House,
Cromwell Park, Banbury Road,
Chipping Norton, Oxfordshire. OX7 5SR.
Phone: +[44] 0608 645000
Fax: +[44] 0608 645155

All others:
IEM International Sales
1629 Blue Spruce Drive
Fort Collins, CO 80524
Phone: (1) 303-221-3005
Fax: (1) 303-221-1909

©1993 Anis, Inc. B1.393

CIRCLE 27 ON READER CARD

must be already in the language.

- It must be easy for the programmer to use. In particular it must be easy to add new functionality to the language, and its interface to the calling program must be clean.

On all these counts Tcl succeeds admirably. "Small" and "fast" are relative terms, but the proof of this particular pudding is in the programs that have used it. Tcl was used to implement a transaction processing library with performance results comparable to compiled C code. Tcl particularly shines in being easy for the programmer to implement. Embedding a Tcl interpreter in a C program is clean and well documented. You can even easily embed several interpreters in a single program, each independent of the others. Conversely, it is also easy to add functions to the Tcl interpreter itself.

Tcl is more than an embedded language. As a tool control language it communicates with non-Tcl programs and acts as a software backplane for interprocess communication. The phrase "interprocess communication" was chosen deliberately. Tcl uses the X ICCM and X itself as a transport mechanism. Tcl also has the powerful `send` command, which sends a command to be interpreted by another Tcl interpreter in another program. Of course, this works only if the second program is also built around Tcl.

Perhaps the most famous non-GUI Tcl application is Don Libes' expect, which allows you to construct wrappers around ordinary programs that expect user interaction. None of the code of the target program need be modified or even available. All you need is a well-defined interface.

What does Tcl have to Do with X?

Or, what is this discussion doing in a column on X? I could justify it with a reference to using ICCM and X transport mechanisms and point to Tcl as a premier example of non-GUI uses for X. This is not necessary. Tcl is conceptually linked with the Tk toolkit, a Motif-like user interface toolkit. (There are non-Tcl languages with interfaces to Tk.) Note I said Motif-like. Tk is not based on Motif, but it has a Motif look and feel to a user of the application. The Tk toolkit itself has profound differences to Motif. Some like this a lot, finding in Tk a cleaner and more elegant API, and argue that the internals of Tk are also better than Motif. Your mileage may vary.

For the rest of this column I will use Tcl or Tk to refer to the combination, with Tcl preferred when I speak of the language itself and Tk when I speak of the user interface. But they're harder to separate than a parrot and a peanut.

What Is Tcl Like?

Tcl code looks like a cross between shell programming and C. At heart it is more Lisp-like, with data becoming code with ease. Some simple Tcl code would be

```
set a 4
if $a < 0 {
    print "a is negative\n"
}
```

This is not going to impress anyone, since simple things can be done simply in most languages. But consider the following code to print out "hello world" on a label on an X terminal:

```
label .hello -text "hello, world"
pack append..hello()
```

Equivalent C code using the Xt toolkit would take 22 lines. But terseness is not the main difference. Tcl/Tk is interpreted. You could sit down and type in code and have the interface appear as you type. Normally you would write the code using the editor of your choice but bypass the compile stage. The seductive nature of this process is illustrated by the fact that Tk was in wide use for a considerable period of time before a WYSIWYG screen designer for it appeared. Users just didn't feel a compelling need.

The vision John Ousterhout presents of interacting applications is glorious. A prime example he gives of wasted effort is the editor part of debugger code. Why should every debugger have to recode a complete editor? Why shouldn't the debugger code be able to call any editor to handle that part of the task? This is the UNIX way. Every task that must do string replacements doesn't include the code itself; it pipes the data through sed. We shouldn't lose this just to get a Window Icon Mouse Pointer (WIMP) interface.

Where do you Get Tcl/Tk?

A version of expect is part of Interex's Contributed Software library (Release 3217, April 1992).

The Frequently Asked Questions (FAQ) for Tcl/Tk is kept at *harbor. ecn. purdue. edu:/pub/tcl/docs/tcl-faq. p0[1-3].* The home site for Tcl and Tk is *sprite. berkeley. edu.* The latest versions as of this date (April 1993) are Tcl 6. 7, Tk 3. 2, and TclX 6. 5. TclX is extended Tcl with nice things like a math library, Tcl shell, etc. Earlier versions of Tcl and Tk are also available on Interworks ftp site *iworks.ecn.uiowa.edu.* To compile the packages, all you need is X11R4. Configuration information for HP-UX is included and building them is straightforward.

Rather extensive documentation is

available with the packages and there is now a wealth of contributed software, including such things as Sybase and SQL interfaces, editors, etc. John Ousterhout is also in the process of writing a book on Tcl that will be published this year. Draft versions of the book are available in PostScript from the same sites that carry the source.

Why Am I not more Enthusiastic?

Part of my objection lies with Tk. It is an interesting toolkit on its own and has its adherents who claim it is more elegant, simpler, easier to modify, and potentially faster than Motif. It is not Motif. Most of my work requires me to work within Motif, which makes Tk of limited usefulness. Using Tk would also cut me off from the tools and widgets being written for Motif. (Of course, using Motif isolates me from the tools and widgets written for Tk or for OpenLook or Athena or interviews or ...) This objection may become moot with new developments. In particular the new COSE initiative of HP, Sun, SCO, Novell, et al may be in the market for a compromise Motify user interface and Tk/Tcl would certainly be a contender along with wksh.

My other objections lie with Tcl, and they are in part aesthetic. Tcl is a new language. In my personal prejudice that's a strike against it. A new language has to bring a strong case with it to make a place in my toolbox alongside well-understood languages with user communities, established practices, utilities, books, and experienced users to consult. This is not a fatal objection because a useful tool overcomes these objections. John Ousterhout himself has said that if he had seen where Tcl was heading when he started development, he would perhaps have made it a dialect of Lisp. Also, Tcl is not an object-oriented language and early users reported that switching to Tcl took considerable adjustment. Tcl is probably not suited for large project development, nor is it intended to be.

None of these objections take away from the magnitude of John Ousterhout's accomplishment. They just mean that for me, Tcl is not the first thing I reach for from my tool box. ◧

Do You Know Where Your Security Holes Are?
Find Them with SecurityAudit/UX!

Have You Heard that UNIX is Notorious for Its Lack of Security Features?
Do You Know Where to Check to See if Your HP-UX System is Secure?
Do You Have the Time to Do This Checking Regularly?
Use SecurityAudit/UX To Do It All!

EVEN IF YOUR SYSTEM IS SET UP CORRECTLY (AND HOW WOULD YOU KNOW IF IT WAS?) AND HAS NO SECURITY LOOPHOLES, IT CAN BE VERY DIFFICULT TO MONITOR SYSTEM CHANGES, AND TO ENSURE THAT SECURITY ISN'T COMPROMISED. THE MAGNITUDE OF THE PROBLEM INCREASES AS THE TOTAL NUMBER OF USERS CONFIGURED AND THE TOTAL NUMBER OF FILES GROWS. IT'S EASY FOR ORDINARY USERS TO CHANGE THE SECURITY OF THEIR OWN FILES TO ALLOW OTHERS TO ACCESS THE CONTENTS. A LOOPHOLE LEFT BEHIND INADVERTENTLY OR ON PURPOSE MAY BE EXPLOITED BY A DISGRUNTLED EMPLOYEE OR A HACKER TO BREAK SYSTEM SECURITY, SOMETIMES MUCH LATER.

SecurityAudit/UX PRODUCES OVER 40 REPORTS, CONTAINING DETAILED INFORMATION ON THE FOLLOWING CLASSES OF PROBLEMS:

- **User and Group-related problems, including weak passwords and non-unique identification numbers.**
- **File-system related problems, including historical tracking of files and detection of potential Trojan horses.**
- **PDF-related security problems, extended to detect changes in ACL specifications.**
- **Logging subsystems status display, and logfile analysis.**
- **Network-related status display and configuration weaknesses.**

SecurityAudit/UX RUNS ON ALL HP-UX BASED 9000 SERIES 700 AND 800 SYSTEMS, AND HAS BEEN SPECIFICALLY TAILORED TO ADDRESS PECULIARITIES OF HP-UX, SUCH AS PDF, ACL AND HP'S SHADOW PASSWORDS.

Call EUGENE VOLOKH for more info!

VESOFT
Purveyors of Fine HP Software
Since 1980
(310) 282-0420

1135 S. Beverly Drive
Los Angeles, CA 90035 U.S.A.
FAX (310) 785-9566

CIRCLE 40 ON READER CARD

REFERENCES:

"The Tcl Language and the Tk Toolkit," John Ousterhout, tutorial, 6th Annual Technical Conference on the X Window System, January 13, 1992.

"Tcl: An Embeddable Command Language," John K. Ousterhout, *Usenix Conference Proceedings*, Winter 1990.

"An X11 Toolkit Based on the Tcl Language," John K. Ousterhout, *Usenix Conference Proceedings*, Winter 1991.

"LIBTP: Portable, Modular Transactions for UNIX," Margo Seltzer and Michael Olsen," *Usenix Conference Proceedings*, Winter 1992.

Larry Headlund is president of Eikonal Systems, a software development company specializing in the optical industry, and a consultant on UNIX and X. He has been working with commercial UNIX since 1982 and with HP-UX since 1984. He can be reached at lmh@world.std.com or 617-482-3345.

Advertiser's Index

Please call or fill out adjacent card for further product information.

READER SERVICE NUMBER	ADVERTISER	PAGE #
12	**Adjile Systems** Adjile is a provider of high quality peripherals for your HP 9000 (disk, tape, optical, memory, workstations, enclosures etc.) at great prices. Phone: (800) 347-7621/Fax: (916) 338-7669.	15
20	**Bear Computer Systems, Inc.** HP-UX MagicDisk—A Virtual Disk and Shadowing package for HP 9000 series 7xx and 8xx machines that is transparent to the user, and installs in only minutes. MagicDisk provides: a pseudo disk option that partitions physical disks into multiple virtual disks, memory disks and ResQue!, a real-time network back-up solution! Phone: (818) 341-0403/ Fax: (818) 341-1831.	69
24	**Bering Industries** Bering provides a complete line of tape drives, removable cartridges, fixed hard drives, and combination subsystems for HP 9000, 3000 and 1000. Phone: (800) 237-4641/ Fax: (408) 374-8309.	21
30	**Bradmark Technologies, Inc.** The premier developers of data management solutions specializing in HP IMAGE database utilities, now includes our industry standard DBGENERAL for the HP-UX market. DBGENERAL's SQLWatch option provides a windows-based Performance Monitor for Microsoft and Sybase SQL Server that provides *real-time* statistics and easy-to-use *live* graphs. Phone: 1-(800) ASK-BRAD/Fax: (713) 621-2808.	11
28	**Chase Research** Chase Research manufactures TCP/IP communication servers and multi-port products for the HP-UX market. Phone: (615) 872-0770/Fax: (615) 872-0771.	81
07	**Combs International, Inc.** Current offerings include X/Motif productivity tools, migration consulting, and data acquisition systems for manufacturing, laboratory, or facility management. Phone: (201) 427-9292/Fax: (201) 427-3428.	49
33	**Concorde Technologies** Concorde Technologies offers a full line of Hewlett-Packard mass storage (hard disk, tape, optical, etc), workstations, RAM memory, software and other enhancements for HP computers. Phone: (800) 359-0282/Fax: (619) 578-3188.	75
18	**C.S.U. Industries, Inc.** C.S.U. Industries buys, sells and rents HP and compatible computers, feature/memory upgrades and peripherals. Phone: (516) 239-4310/Fax: (516) 239-8374.	51
31	**Datasys Computer Corporation** Datasys offers you a full-line of quality memory products for HP 9000 and HP 3000 systems, including memory products that support HP's 8xx, 9xx and Emerald platforms. Phone: (800) 328-2797/Fax: (214) 931-9619.	1
34	**Devcom Mid-America, Inc.** Devcom's FaxFX allows users to send, receive, view and print faxes from UNIX System. Phone: (708) 574-3600/ Fax: (708) 572-0508.	7
	Genstar Rentals To meet immediate and short-term needs, rent from our $75+ million inventory of HP, Sun Tadpole, BriteLite, Apple, Compaq, IBM, etc. Phone: (800) 422-3300/Fax: (214) 386-7789 and in Canada (800) 387-6646.	57
04	**Herstal Automation Ltd.** Famous for our high capacity memory on HP 1000 computers, we have solutions for 3000s and 9000s, too. Products include unattended tape backup, disks up to 2 gigabytes, workstation memory and specialty device drivers. Phone: (313) 548-2001/Fax: (313) 548-2010.	41
05	**Holland House** Holland House specializes in products for multi-platform environments. Products offered are for network spooling and data-center management and control. Phone: (512) 288-7540/Fax: (512) 288-4240.	71
27,21	**IEM, Inc.** Manufacturer and developer of HP compatible hardware including optical disk drives, back up tape drives, library system controllers, hard disk drives, memory boards and interface products. Phone: (800) 321-4671/ Fax: (303) 221-1909.	61,79
36	**Insignia Solutions Inc.** Insignia Solutions Inc. is the industry's leading provider of high-quality PC emulation solutions for UNIX-based workstations and Macintosh computers. The company develops, markets and sells products designed to run Microsoft Windows and MS-DOS applications on HP, IBM, SGI, NeXT and Sun/SPARC workstations and Macintosh computers. Phone: (508) 682-7600/Fax: (508) 688-8294. In the UK, Phone: +44-494-459426/Fax: +44-494-459720.	Inside Front Cover

READER SERVICE NUMBER	ADVERTISER	PAGE #
42	**ITAC Systems, Inc. – Mouse-trak** Mouse-trak is designed for HP users looking for a reliable input device that reduces the risk of repetitive motion injuries that can be caused by the conventional mouse. Phone: (214) 494-3073/Fax: (214) 494-4159.	3
37	**KL Group Inc.** KL Group develops XRT Products for X Window System developers. XRT/graph and XRT/3d are sophisticated graph widgets that can be used to create any type of 2-D or 3-D graph. XRT widgets can be used with all of the leading GUI development tools. Phone: (800) 663-4723 or (416) 594-1026/ Fax: (416) 594-1919.	29
35	**Kelly Computer Systems** Manufacturer of performance products: RAMDISC, Spectrum memory, Classic memory, and PC and LaserJet memory. Phone: (415) 960-1010/Fax: (415) 960-3474.	85
39	**Lund Performance Solutions** Lund Performance Solutions is the premier provider of HP 3000 and HP 9000 performance monitoring and management software. We also offer a wide range of consulting and training. Phone: (503) 926-3800/ Fax: (503) 926-7723.	77
38	**MiniSoft, Inc.** MiniSoft, Inc. develops connectivity software for linking PCs and HP minicomputers serially and via networks to carry out terminal emulation, word processing, electronic mail, data retrieval, and other client/server applications. Phone: (800) 682-0200/ Fax: (206) 668-2435.	14
02	**Quest Software** NBSpool for UNIX gives operators and end users a simple yet powerful way of managing output and spooled devices. With NBSpool, the UNIX spooler can easily meet the heavy demands of commercial UNIX applications. Phone: (714) 720-1434/Fax: (714) 720-0426.	35
13	**S.A.R., Inc.** S.A.R., Incorporated is an independent distributor of HP/Apollo workstations. We can supply spare parts, upgrades or custom configure systems. Phone: (508) 521-6656/Fax: (508) 372-0999.	67
16	**Sterling Software** Sterling Software is a global leader in EDI and electronic commerce software products, value-added network services, trading partner implementation assistance, and education, training, and consulting services. Phone: (800) 879-3341.	89
10	**Technical & Scientific Application** Call TSA for new, used, and remanufactured HP equipment. Buy, sell, rent or lease, TSA specializes in HP 9000. Phone: (800) 422-4872/Fax: (713) 935-1555.	83
11	**Ted Dasher & Associates** Ted Dashers specializes in new, used, and remanufactured HP 9000 equipment. Phone: (800) 638-4833/Fax: (205) 591-1108.	83
22	**Texas ISA, Inc.** Since 1979 ISA has been manufacturing various peripherals for the Hewlett Packard 9000 series 200/300/ 400/700/800 workstations and file servers. Phone: (713) 493-9925/Fax: (713) 493-2924.	59
23	**Tryonics Inc.** Tryonics Inc. is a provider of quality remanufactured HP/Apollo, Apollo Domain series workstations, spare parts, network and software consulting services. Call (800) 551-6236/Fax: (603) 427-6843	Inside Back Cover
43	**Unison-Tymlabs Corporation** Unison-Tymlabs is a leader in providing networked systems management tools to the Hewlett Packard marketplace. Unison-Tymlabs' suite of integrated systems management products allow the user to automate essential information systems tasks for maximum efficiency and cost savings. Phone: (408) 245-3000 or (512) 478-0611/ Fax: (512) 479-0735.	4
40	**VESOFT, Inc.** VESOFT creates system software to the Hewlett-Packard installed base and has been providing system security control and auditing software since 1980. SecurityAutdi/UX allows system managers to quickly and easily monitor their HP-UX systems for security weaknesses and aids in closing security loopholes. Phone: (310) 282-0420/ Fax: (310) 785-9566.	63
29	**Walker, Richer & Quinn, Inc.** WRQ (Walker, Richer & Quinn, Inc.) develops and markets Reflection software—PC products for terminal emulation, networking, and development tools. Phone: (800) 92 NETWORK/Fax: (206) 322-8151.	Back Cover

HP-UX Systems Administration

by Chris Curtin

Tips and Tricks: Part 1

ONE OF THE THINGS I have always disliked about other "Administration" columns, and something that I try very hard not to do with this one, is reciting verbatim from the vendor-supplied manuals. If I cannot add something to the vendor's text, I will not write about it.

Another dislike is how useless much of what is presented is. Theory is great, but we get paid for our actions. This month I am introducing what will, I hope, be a periodic subject: Tips and Tricks.

For most of us, our systems are installed and stable. What we must do now is keep them that way. I am always on the lookout for something to help me make my workday easier and address problems quicker. All these tips and tricks take up a couple of paragraphs and do not contain enough information to stretch into a full column, so I am grouping them together.

Trick #1: Real-time Logins

HP-UX provides a very nice feature called *Real-time Priorities*. This feature allows a program to demand a constant priority by the scheduling system and not have its priority degraded as time passes. (This is a very basic description of real-time priorities; see rtprio(2) for more information about them.)

A process with real-time priority has control of the CPU until either it releases it or a process with a higher (lower numerically) process preempts it. This, of course, means that if a real-time process goes into a tight loop, it is almost impossible to kill it.

Note that I said almost. The highest priority that a process can have is 0. A process with this priority cannot be killed unless it releases control to the CPU. Since it is the highest, it can interrupt any other process.

The company I work for develops software that requires real-time priorities. Since we are developing the software, sometimes things go wrong and we need to kill a process. That is where real-time logins come in. In a nutshell what we do is have a login with a priority of 0.

The first step is to allow real-time priorities. In your */etc/rc* file, in the localrc section, place the following lines:

```
#
#  Allow real-time priorities
#
/etc/setprivgrp -g RTPRIO
```

NOTE: The above command gives real-time priorities to all groups. You may want to change this. See setprivgrp(1M) for the other forms of this command.

Next you need to set up on the console or the tty you want a getty with a priority of zero. Edit the */etc/inittab* file and locate the existing entry for the port. Copy the line and comment it out. Modify the copy to assign a real-time priority to the getty. The following example sets up the getty on the console to have a priority of 0:

```
cons::respawn:/usr/bin/rtprio 0 /etc/getty console console # system console
```

I can already hear gasps and see people saying, "He just gave real-time priority to anyone who logs in on the console!" Yes, I did, and I am about to take it away.

Obviously you do not want anyone who logs in on the console to have a priority of 0. Nor do you want root to have a priority of 0. What you do want is a special login that has a priority of 0.

Create such a user. Call it *root0* or something else. Do not call it *real-time* or something else that indicates its use. Also do not use SAM for this. If you want this user to have its own home directory, create it by hand. Edit */etc/passwd* and copy the root entry. Change the name of the user and the shell if necessary. If you are using NIS or a secure system, you will not be able to do this by hand. When SAM complains about reusing the UID of 0, ignore it.

Change the password for this user. You can make it the same as the root password, but I recommend against it.

Finally, if the person logged in on the console is not this special user, reset their priority. Edit both */etc/profile* and */etc/csh.login*. For */etc/profile* add the following line after the PATH is set up:

```
/usr/bin/rtprio -t -$$        # Normal priority
```

In */etc/csh.login* add the following lines after the PATH is setup:

```
#
#   If we are not root0, use regular # priorities, else
#   go real-time
#
    if ($LOGNAME != "root0") then
       /usr/bin/rtprio -t -$$
    endif
```

I am assuming that the root0 login uses csh. If not you can change the */etc/profile* script to perform the test.

What is happening here is that I am looking to see if the login name is the name of my special user. If it is not, I am assigning the default priority to this process. Anyone who logs in whose login name is not root0 will receive a default priority. No more security hole. If you have users who have shells other than the C , Korn, or Bourne shell, place similar checks in their startup files.

Now when your system appears to be locked up or very slow, you can log in as root0 and have the highest priority as well as the permissions of root.

One warning though: If you forget about the real-time login and try to log in as root, you have lost your chance. The system will log root in with a default priority and then lock up like everything else. For this reason you may want to assign a real-time getty to a modem port. Leave the modem off and turn it on only when you are having problems. You can also do this with an ASCII terminal; just do not attach the serial cable until needed.

Tip #1: Read comp.sys.hp

comp.sys.hp is an Internet news group specific to Hewlett-Packard systems. This means any Hewlett-Packard system, from HP 85s to the latest 9000 multiprocessors. If you ask a question in this group, someone will probably know the answer to it.

If you do not have Internet access you should try to get it. I do not recommend becoming a site directly on the net, but rather getting a limited UUCP feed for incoming and outgoing news and mail. The steps of setting up a news and e-mail feed are very complicated and you will do best asking your feed for help. Finding a feed is also very easy. Attend the next UNIX users group meeting in your area and ask if anyone can supply you with a feed. If you do not have a local UNIX group, ask in the PC and Amiga groups—they might know who has feeds available. If all else fails, call UUNET. They supply feeds for a monthly fee; however, most of the local systems probably are free.

After reading comp.sys.hp for a couple of weeks you will get a feel for how the group functions and who some of the major players are. There are a number of Hewlett-Packard employees who read the group and respond. They are "unofficial" but you are getting the information straight from the people who design and build the systems.

There are literally hundreds (thousands if you consider the alt hierarchy) of groups that deal with all subjects. Many do not have anything to do with computers. I read misc.consumer.house for tips on do-it-yourself home projects.

For those who do read comp.sys.hp: There is a move on to divide the group into several subgroups addressing specific areas. The volume in the group now is overwhelming. The discussions are mostly in news.groups but there is some spillover into comp.sys.hp. When the Request For Vote is issued, vote so we can clean up the group.

I will be writing a future column about the reorganization and what the new groups are.

Give Us a Call for ALL Your HP/Apollo Needs.
We Cannot be Undersold!

We Are One of the Largest Independent Distributors in the U.S.A.
WE HAVE IT ALL!!

Everything from DN580 - DN10,000
HP 9000 Series from HP400 through HP750
ALSO
Spares and Complete Systems in Stock

* 24 Hour Delivery Available
* 90 Day Warranty On All Workstations & Spares
* Complete Export Services Available

We Also Buy, Rent & Lease!

S.A.R. INCORPORATED

11 Rogers Road, P.O. Box 8161 Haverhill, MA 01835-0461
Telephone (508) 521-6656 Fax (508) 372-0999

CIRCLE 13 ON READER CARD

Tip #2: LaserROM

For the past two years HP has been supplying all of its documentation and software products on CD-ROM. Monthly updates to this CD-ROM keep you current on all manuals and non-core software updates.

I do not know if the special offer will still be valid by the time you read this, but HP has a deal in which they will give you a SCSI CD-ROM drive if you subscribe to the LaserROM product.

A very detailed description of LaserROM is in the March 1993 issue of *hp-ux/usr.*

The CD-ROM drive has more uses than just LaserROM. Several organizations are releasing CD-ROMs of public domain and Copy Lefted software ported and guaranteed to run on HP-UX. For $50 to $200 you can get all the GNU tools and hundreds of other software products. This is a godsend for those of us who do not have FTP capabilities and cannot get these programs.

Tip #3: Subscribe to the HP-UX PATCH List

One major negative about HP is that they do not mail patch lists to customers. I do not know if other vendors do, but it is a pain to run into a problem, call PICS, and have them tell you that they have a patch for that problem and have them send it to you.

One solution is to subscribe to the HP-UX PATCH mailing list. A mailing list is similar to a newsgroup except that you receive your messages via e-mail instead of from a news feed.

The way the mailing list works is that as members receive patches from HP, they post the name and description of the patch, as well as whether or not it worked. You receive this information and determine whether the problem applies to your system. If it does, you can contact HP and ask for the patch.

To join the mailing list, send a note to *hpux-patch-request@cv.ruu.nl* and ask to be added to the list. You will receive information about the list and will start receiving patch information.

Tip #4: Send Me Your Tips and Tricks

I am always looking for tips and tricks to make my job easier. If you have any good tips and tricks and are willing to share them with me and the readers of this magazine, please send them to me. I will give you credit for them when they are published.

I am hoping to have a column devoted to Tips and Tricks every six months while the magazine is published every other month and more frequently if the demand is there.

I have received some e-mail from readers—Thanks. I have received good suggestions for future columns and plan on using them, but I am still looking for feedback from the readers about this column.

Next time I will discuss installing and updating HP-UX 9.0 on a couple of 800s and a 720. ◧

Chris Curtin, a software developer for Bradley Ward systems, Inc. in Atlanta, Georgia, specializes in device driver development for factory automation on the HP 9000. He can be reached via e-mail at: chris@bwilab3.atl.ga.us

CD-ROM

by Bill Hassell

Setting Window Sizes in LaserROM

BEGINNING WITH THE LATEST version of LaserROM (B.01.00), there are X resources for each of the main windows that are defined in the *man* page for LaserROM. Also note that the -geometry resource still has the functionality to place the Library and Reader windows at a specific location. For example:

```
lrom -geometry +100+10
```

will locate the main (LIbrary) window at the upper left corner of the screen. The dimensions such as -geometry 800 x 800 have been replaced by the new resources (see the *man* page), which is excellent news. Now you can specify the shape of all the windows according to the monitor's resolution or personal preferences. Here's an example of a startup script that sets the various resources depending on whether the user has a medium-resolution monitor (1024 x 768) or high-resolution (1280 x 1024).

```
#!/bin/sh
#
#  This script is used to execute lrom on a central server and redisplay
#    the results on local display. The assumption is that the video
#    display is 1024x768 for 300 computers and 1280x1024 for all others.
#    Be sure to modify accordingly if this is not true for your site.
# Customization for lrom parameters:
# ---------------------------------
#   Parameters supplied *after* this script's name will be passed
#   to the lrom program directly (ie, -foreground red, etc) as in:
#
#      lrom2 -foreground black -background green
#
# Script variables:
#-----------------
# The compute server is $ROMHOST
# The user's display is $MYCRT
# The architecture is $ARCH       (will always be 300 or 800)
#
ROMHOST=hpuerci.atl.hp.com
MYCRT=`hostname`:0
#
# Determine what type of machine is running the script
#   (note: 700=800 and 400=300; the /bin/hp9000s* scripts are linked)
#
/bin/hp9000s300
ARCH=$?
if [ $ARCH = 1 ]
  then
  ARCH=800
```

```
else
  ARCH=300
fi
#
# for security, just add this one computer to xhosts
#
xhost + $ROMHOST >/dev/null
#
# fire off lrom on the remote system.
#
echo "Starting LaserRom-II on system $ROMHOST, display=$MYCRT."
#
# Set default resources depending on 300 vs. 700 ews
#   These may be overridden by add'l params provided by user at end of
#   the command line for this script.
#
if [ $ARCH = 300 ]
   then
   remsh $ROMHOST "exec /usr/bin/lrom -display $MYCRT \
   -geometry +100+10 \
   -title 'LaserROM/UX (Atlanta Response Center)' \
   -xrm 'LRom*IconName:                    LROM' \
   -xrm 'LRom*fontList:                    helvb12' \
   -xrm 'LRom*Font:                        courr14' \
   -xrm 'LRom*browseWidth:                 65' \
   -xrm 'LRom*mainLibrary.height:          730' \
   -xrm 'LRom*mainLibrary.width:           400' \
   -xrm 'LRom*mainReader.height:           700' \
   -xrm 'LRom*mainReader.width:            900' \
   -xrm 'LRom*searchWindow.height:         500' \
   -xrm 'LRom*searchWindow.width:          750' \
   -xrm 'LRom*Foreground:                  White' \
   -xrm 'LRom*Background:                  SlateBlue' \
   -xrm 'LRom*highlightColor:              Yellow' \
   -xrm 'LRom*hitTermfg:                   NavyBlue' \
   -xrm 'LRom*hitTermbg:                   Pink'" \
   $* </dev/null>/dev/null &
else
   remsh $ROMHOST "exec /usr/bin/lrom -display $MYCRT \
   -geometry +100+10 \
   -title 'LaserROM/UX (Atlanta Response Center)' \
   -xrm 'LRom*IconName:                    LROM' \
   -xrm 'LRom*browseWidth:                 60' \
   -xrm 'LRom*fontList:                    helvb14' \
   -xrm 'LRom*Font:                        courr18' \
```


Disaster strikes...

How will YOU recover your critical data?

MagicDisk™

System Software Solutions
NOW available for HP/UX users!

ResQue! Realtime back-up of data across a network without impacting transaction time

Shadowing For data fault-tolerance and improved disk read performance - a unique RAID solution!

Memory Disk A fast, temporary software-based disk that improves I/O operations

VMS systems and UNIX systems

Call today for more information about our free product demonstration package.



Bear Computer Systems Inc.

9584 Topanga Canyon Bl.
Chatsworth, CA 91311

(800) 255-0662, dept. inx
(818) 341-0403, dept. inx
FAX: (818) 341-1831

CIRCLE 20 ON READER CARD

```
    -xrm 'LRom*mainLibrary.height:          825' \
    -xrm 'LRom*mainLibrary.width:           475' \
    -xrm 'LRom*mainReader.height:           825' \
    -xrm 'LRom*mainReader.width:            1100' \
    -xrm 'LRom*searchWindow.height:         560' \
    -xrm 'LRom*searchWindow.width:          1000' \
    -xrm 'LRom*hitTermfg:                   NavyBlue' \
    -xrm 'LRom*hitTermbg:                   Pink' " \
    $* </dev/null>/dev/null &
fi
```

Note that the above script executes lrom on a remote machine and redisplays the results locally. You can extract the settings as needed for your system.

Monthly LaserROM Subscription Services

Monthly distributions of the LaserRom CD are currently being shipped to customers on services that have been out of support life since 4/01/90. These contracts should have been rolled to replacement services at the time of renewal. (See services listed below.)

Effective with the May CD, these obsolete services are no longer used for shipments.

SYSTEM	OBSOLETE SERVICE	REPLACEMENT SERVICE
MPE/V	50726A+R00-011	50726A+R00-001
	50610A	"
	50610B+R00	"
MPE/iX	50726A+R00-012	50726A+R00-002
	50611A	"
HP-UX	50726A+R00-013	50726A+R00-003

Turbo Cleaning Disc

Here's a new approach to cleaning CD players (audio or CD-ROM): Pop in the Turbo Disc and a high-speed breeze of air cleans the lens. There are several brush-style cleaning discs that can eventually smear the lens with airborne grease particles. The Turbo Disc avoids this problem by using air.

The Turbo Disc runs about $25 in many record stores and mail order catalogues.

More on Do-It-Yourself CDs

Last year, JVC announced their ROM maker, which shattered the over $10K price barrier for recording CD drives. Now JVC offers their Personal RomMaker in mixed mode (audio or Red Book and CD-ROM or Yellow Book standard) along with several other features such as a digital directory for automatic (computer-controlled) audio playback and mixed PC/UNIX or Mac formats to be located on track 1. The mixed-mode version contains a built-in 680MB SCSI disk.

Along with the Personal RomMaker and Mixed-Mode RomMaker, JVC offers the Personal Archiver, which is a very simple backup device, allowing files and data to be archived onto the internal hard disk and then copied to a CD-ROM. Contact JVC at (714) 965-2610.

Pinnacle Micro has announced a low-cost CD-ROM writer for only $3,995 including software. It works with the Mac or the PC. Contact Pinnacle Micro at 714/727-3300 or 800/553-7070.

Trace has announced a new, high-speed mastering system that can record either tapes or one-off CDs in less than an hour. A 560-MB disc can be created in 37 minutes and a 680-MB disc in 42 minutes. Their product can create Red Book audio discs, Yellow Book CD-ROMs, and Orange Book CD-RM XA discs, supporting up to 16 CD-ROM writers simultaneously. Trace can be reached at 408/441-8040.

Another under-$10,000 CD-ROM mastering system is Optical Media Int'l's TOPiX system, for about $8,500 (call 800/347-2664). Also, Philips makes a CD-ROM recorder for less than $6,000 that features high-speed recording, recording on the small 3-inch CDs, partial recordings (finish the disc at a later time), and caddyless disc loading.

New PhotoCD Software

PhotoCD is looking better every day as more and more vendors provide support for reading and manipulating the images. Photo Factory for Windows provides an easy-to-use interface in Windows 3.x including zoom, rotate, crop, and mirror image capabilities. The images can be saved to the Windows Clipboard or exported in standard image file formats, and they can be cropped in irregular image shapes. A slide show feature allows the PC to display the images in slide show fashion. Both 8-bit (256 colors) and 24-bit (16 million colors) are handled and images can even be

converted to grayscale. Photo Factory retails for about $70. Contact The Multimedia Store at 800/597-3686.

Changing CD-ROMs

One the best features of CD-ROMs is that their low cost allows updating the information monthly or bimonthly. However, for online systems like LaserROM, changing the CD in a shared environment means that all copies of LaserROM must be terminated (killed in HP-UX terms) before the disc(s) can be unmounted. The old HP-IB CD-ROM drives did not have a lock-media command and therefore the discs could be removed without unmounting them. The new SCSI disc drives have a media-lock that is executed as part of the `mount` command and unlocked with the `umount` command.

Changing the media without `umount` will cause all the copies of LaserROM to abort eventually with invalid index or database references. This will also happen if the CDs are NFSmounted and changed in the server—all remote copies of LaserROM will abort eventually. Currently, there is no mechanism to verify the validity of the CD after the program is running, so information administrators will have to schedule specific downtimes to change the discs. ◧

Bill Hassell is an HP-UX system support engineer at the HP Atlanta Response Center. He can be contacted at his e-mail address, which is blh@hpuerca.atl.hp.com.

If Network Printing Problems Are Giving You Nightmares...



You Need UNISPOOL!

Networked printers can cause as many problems as they solve.

That's why UNISPOOL was designed to meet your specific network printing problems. UNISPOOL offers solutions to problems associated with network environments where there are diverse applications, multiple printing resources and little room for error. UNISPOOL can manage your spoolfiles effectively, efficiently, and securely even in mixed computing environments.

UNISPOOL is installed on thousands of machines throughout the world and is used by 40% of America's Fortune 500 companies.

UNISPOOL is available on a wide variety of operating systems and PC servers:

- HP MPE V/XL
- HP HP-UX
- HP/Apollo DOMAIN
- IBM AIX
- SCO UNIX
- DEC ULTRIX
- LAN Manager OS/2
- NOVELL

If you have nightmares just thinking about your network printing environment, contact us for a *free* demonstration.

UNISPOOL — The World's Premier Network Printing Solution.

NORTH AMERICA
Holland House
P.O. Box 91027
Austin, TX 78709
Tel: (512) 288-7540
Fax: (512) 288-4240

HOLLAND HOUSE

EUROPE
Holland House bv
Molenkempsweg 1
5306 ZX BRAKEL
Netherlands
Tel: +31 (4187) 3000
Fax: +31 (4187) 3060

CIRCLE 05 ON READER CARD

Chart Your Course for Interex





Interex '93, September 19 to 23, will take place in the city beside the Golden Gate—the fabled harbor entrance from the Pacific Ocean to the San Francisco Bay.

Encompassing almost 500 square miles of water, the sparkling, island-studded bay is a major center for water-borne commerce. It also offers an array of waterfront attractions and opportunities "to get out in the bay" to experience its wonders.

A favorite spot on the bay's nautical rim is Pier 39, a festive marketplace with two levels of unique restaurants, one-of-a-kind shops, a waterfront park, and unparalleled views of the bay. More than 300 state-protected sea lions have taken up residence on several docks of its marina.

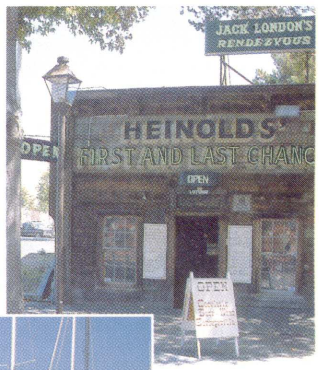
Nearby is Fisherman's Wharf, with its dozens of seafood restaurants, rows of colorful boats, and outdoor stands offering a taste of the best of the catch. You'll also find Ghirardelli Square, a converted 19th century factory compound with even more opportunities for views and gastronomical delights, and Embarcadero Center, a city within a city, with hundreds of outdoor cafes.

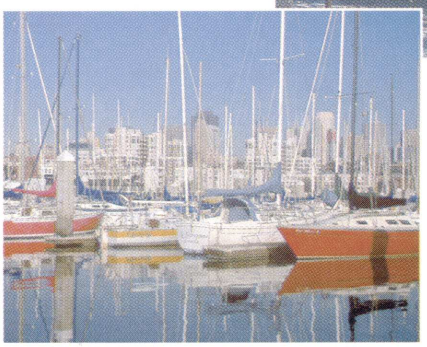
Waterfront History

The San Francisco Maritime National Historical Park, which takes visitors on a trip through the city's seafaring past, has gathered one of the finest collections of historical ships, models, and maritime artifacts in the world and boasts the largest collection of historic ships by tonnage. Favorites are the SS Jeremiah O'Brien, the last unaltered WWII "Liberty" ship, a WWII fleet submarine you can board, and the S/V Balcutha, a square-rigged vessel that sailed during the 1880s and 90s.

This historic area is in Aquatic Park, a bayshore cove that invites visitors to walk, jog, bike, or fish along a promenade with vista points of the Golden Gate Bridge.

'93 and San Francisco Bay





A quick drive over the first span of the Bay Bridge takes you to Treasure Island, a man-made isle built from a mud flat for the 1939 Golden Gate International Exposition. It holds exhibits on the sea services in the Pacific and the China Clipper flying boats.

The second span of the bridge takes you on to Oakland, with more waterfront finds, including Jack London Square, a complex of eateries and watering holes, including a saloon in a cabin once used by London.

Water Excursions

Yearning to get right out on the bay? Sightseeing cruises are offered by several fleets that whisk you to Angel Island, with its idyllic cove and grassy rises for picnickers. It has 12 miles of hiking trails with panoramic views and museums with memorabilia from its history as the "Ellis Island of the West." Some vessels transport you to Alcatraz, a once-grim bastion that now offers self-guided tours. More elegant white linen luncheons and dinner/dance cruises are available on the Hornblower Dining yachts.



Photos by Ron Wright

For the more adventurous, Spinnaker Sailing offers you a chance to see the bay from a brigantine sailing vessel. The mates give a bit of history and give you a chance to take the helm.

The bay's blend of nautical, historical, and scenic features is a stone's throw from Interex '93. Enjoy the conference and extend your stay to enjoy the fabulous bay!



CSL/HP-UX

In my last column, I shared some thoughts about the transformation of the Contributed Software Library. Just to recap, the HP-UX CSL is becoming more important in many sites as a way of providing needed capabilities. This coincides with the shift toward packaged software and away from in-house-developed code. This has a down side, though: with less in-house development, there are fewer programmers developing tools that might become contributions to the CSL. The net effect is a re-evaluation of both what goes into the CSL and the ways that Interex could make it more useful to the members. The driving principle for the CSL is to deliver a service that meets many of your needs.

I was invited to attend a recent CSL-MPE committee meeting at which some of these issues were explored. I am very encouraged with the discussions and the sense of teamwork that came out of that meeting. You can expect to see much more cooperation among the MPE/RTE/HP-UX communities in the future. We are proceeding with some initial steps in order to build our expertise and capabilities to support the members' use of the CSL.

A very visible step will be the joint

1993 CONTRIBUTED SOFTWARE LIBRARY / HP-UX

DRAFT TABLE OF CONTENTS

faq	Frequently Asked Questions
gnuemacs	Emacs Editor
emacs	HP version of the emacs editor
xntp	network time protocol
dtree	Display directories in a tree structure
c-news	C News NewsNet Package (Performance Release)
usenet-docs	Usenet (network News) Documents
getethers	get Ethernet addresses of network
nntp.1.5.11	Network News Transport 1.5.11
getscsi	return scsi inquiry command data
newsnet-patches	Patches for CSL-2934 A0036
mtstat	get magtape status
name	List users on the system by full name
uemacs	Micro emacs
tk3.2	A Motif Toolkit implemented with Tcl
diffdir	Run diff against files in 2 directories
field	Extract a field from data
gifs	Misc gif and jpg images
xgrab	Capture X-window graphics/save as a file
sc-6.21	Public Domain Spreadsheet
X11R5-fixes	Latest Fix files for X11R5
imake-4.00	imake utility for hp-ux
sketch-fixes	Various additions to Phil Waldens Sketch
xv-2.21	X Image viewer
sunclock	Display daylight on a world map in X
Xaw_Xmu_libs	Athena/Misc Widget Libraries for X11
f2c	Fortran to C converter
libnat	RTE Relocatable Library routines for HP-UX
mau	MAU - Migration Analysis Utility
port/rx	Port/RX sources
term	Determine terminal type
pwagerpt	Password Age Report
pwexpmsg	Password Expiration Message
he	Hex editor
inetlp	lp interface for telnet connected printers
WHOZN-HPUX	Who is logged on - HPUX version
WHOZN-RTE	Who is logged on - RTE version
w_hpux	A public domain replacement for w and uptime
qotd	Quote of the Day
BSDTIMESYNC	Synchronize Networked System Times
vcp	Remote HP/1000 vcp downloader



CIRCLE 33 ON READER CARD

submissions on the 1993 conference swap tape. We decided to put this effort together as a way of encouraging the MPE community to investigate the use of the POSIX capabilities on MPE/iX. Users who contribute to the MPE swap tape will also receive the HP-UX contributions. The HP-UX users will also get back all the POSIX-compliant submissions from the MPE tape. In addition I will be working with several MPE members to port some of the existing HP-UX CSL contributions to MPE/iX. We believe that Interex members will benefit from this effort, with the infusion of new software into both CSLs at a time when it is in high demand.

We are also taking steps to improve the distribution and access to the CSL by members. With only one release a year, and the rapidly changing environment to deal with, the current scheme of production and distribution is not answering the members' needs. I would like to see more work done on providing an online distribution vehicle where members could download the latest versions of contributions as soon as they become available. This would get needed software into your hands quickly. We would also be able to offer some expanded information capabilities (conferences, information archives, etc.) that would greatly enhance the benefits of Interex memberships. Stay tuned as these things roll out in the coming months.

In closing, I would encourage each and every member to keep asking questions and keep bugging the committees—let us know what you expect. I don't always know the answers, but I might be able to point us in the right direction.

The 1993 CSL will soon be released. We are on track for shipments to begin at the end of May. I have to apologize for the two-month delay; we intended an April 1 release, but resource problems plagued both Interex and my own workplace. Included here is the list of contributions we have so far; I have a few more to add over the next week. ◧

Paul Gerwitz is chairman of the CSL/HP-UX committee and a system analyst at Eastman Kodak Company in Rochester, New York. He can be reached at 716-477-3067 or e-mail at gerwitz@interex.uucp or gerwitz@kodak.com



HP-UX News

The Heart of the Old Southwest Hosts InterWorks Conference

THE INTERWORKS BOARD of Directors invited the Interex Chairman, Tom Idema, to attend the InterWorks 93 HP Workstation Users Group Conference, held in Phoenix, Arizona, April 25–28. Unfortunately for Tom, and luckily for me, he was unable to attend, so I got to go instead. Since this is my first year as an InterWorks member, and because I am using an HP workstation to TELNET into the HP 1000s, I was really excited about the trip.

By the time I got there, seminars had been going on for two days, and all the more experienced folks were already learning and playing; but this neophyte had arrived too late for anything other than a shower and to bed.

Monday morning, I picked up my registration packet and met some of the HP support people who worked behind the counter. I had corresponded with them in preparation for the trip, so it was really nice to put faces to the names and voices. This is of course one of the nice things about conferences of any type. In an e-mail world, I would like to address all the problems via e-mail and save the face-to-face meetings for the fun times. Then I attended some papers and found them to be very similar to the RTE track at our annual conference. (Once a techie always a techie.)

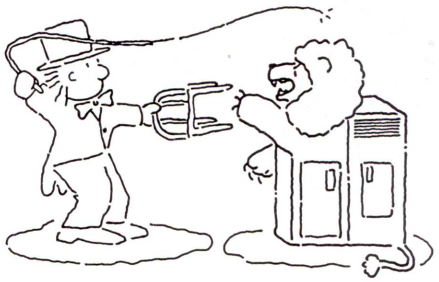
Monday afternoon was spent touring the Vendor Show and the "technology lab." One of the things I always enjoy at the Interex Conference is the Vendor Show. I learned a lot from talking with the vendors, so that part was no different. I was dazzled by the "technology lab" when I toured it. This is truly a wonderful part of the InterWorks Conference experience. Basically, the lab consists of about 20 workstations in a good-sized room, all joined by a LAN. There is an 140-page workbook of experiments and demonstrations that is part of the registration package, which the attendees carry around to fill in as they sit down for hands-on use of the various systems. There are HP people assigned to help the attendees with any questions. By the way, because of this kind of staffing effort, there were 150 HP personnel at the show for 350–400 attendees. Both the Lab and the Vendor Show (also called the "arcade") were open until 7 p.m.

Tuesday morning, I made contact with some of the folks I work with in SWT. That led to other contacts, and pretty soon I was meeting quite a few of the InterWorks folks, plus running into some Interex members. Meeting other users and talking about the joys and sorrows of being a computer professional (whatever that means) is as important to me as all the papers, vendor presentations, and seminars.

I spent some time just hanging out and joining in various conversations in the hallways. Several times I was mistaken for "Someone in Charge" because I was wearing my Interex BOD badge. Several attendees asked me, "So what's the difference between Interex and InterWorks, and why are there two of them?" This question was asked by HP field personnel even more often. This is a very good question, and I'm not sure I have a satisfactory answer.

Some purely personal impressions, in no particular order: The average InterWorks member thinks that Interex = MPE. There is little awareness of the RTE and HP-UX components of Interex. It is a common impression among the InterWorks members that the HP lab managers are uniquely accessible at their conventions, that any member can wander up and talk to them.When I

Take Control of Your System's Performance



with Robert Lund's Taming the HP 3000 Vol. II Book!

Let Robert Lund's book teach you how to whip your system into shape. Getting control of your hardware investment with his new book, will extend the life of your Classic or XL System.

Taming the HP 3000 Vol. II contains:

- Over 300 full-size pages, complete with graphs, charts, tables and figures.
- Methods of predicting future hardware requirements (capacity planning).
- Practical and easy approaches to dealing with performance crises.
- Ways to identify problem areas and how to "fix" them.

NEW Vol. II

It will give new life & meaning to Managing your System's Performance! You will not believe the results. Hurry and call now for more information!

****SATISFACTION/MONEY BACK GUARANTEE!****

1-503-327-3800 or Fax 1-503-327-3276
34130 Parkwoods Dr. NE • Albany, OR USA 97321

LUND PERFORMANCE SOLUTIONS

CIRCLE 39 ON READER CARD

mentioned IPROF (Interex Programmers Forum), it really got some attention. With regard to advocacy, the InterWorks equivalent of our System Improvement Committee Survey process is done in a one-hour session at their conference.

Tuesday night was the occasion for a Western hoedown (Arizona-style) that was quite a lot of fun, and I got to talk one-on-one with several folks. The view of Phoenix from the mountain was stunning, the food was top-notch barbecue, and the entertainment was, well, entertaining. There was simulated gambling at the gaming tables, with appropriately attired "olde tyme" ladies and gentlemen to serve as dealers and croupiers. The winnings were of use later in an auction. I can't tell you what was auctioned off, because I was such a poor gambler that I had no winnings to use in the bidding! My daddy taught me in the very best way possible that I should never gamble—he always won, no matter what the game.

On Wednesday I attended more papers and found some valuable resource people for the Interex Internet connection project. I also attended some of the seminars that I had missed the prior weekend, as they are repeated after the show. Seems like a pretty effective arrangement, but it does extend the amount of time that the presenters must be at the conference.

The results of the elections were announced, and Jim Rice and Mary Ann Berg were elected to the InterWorks board. Jim is an HP employee in the professional services organization and Mary Ann comes from a university background and has a wealth of experience from the Domain/ADUS days.

I flew back to San Jose on Wednesday afternoon, reluctant to miss some more seminars that looked interesting, but a fellow does have to earn a living sometime. I was very satisfied with my experience at the conference, as it passed the "Steve Gauss" test. Steve told me that his criterion is that he must learn something at the conference that will save his employer (which is us indirectly, as he works for Uncle Sam) more than the cost of attending. I felt that my time was well spent. If you are an Interex member who now has HP workstations in your shop, you should also consider joining InterWorks; but if you can attend only one conference, you have to decide which focus meets your information needs. The InterWorks Conference is tightly focused on workstations alone, while the Interex Conference presents workstations in the context of the larger computing resource puzzle. Interex will feature the latest on HP-UX servers and workstations at the Interex '93 Conference & Expo, September 19–23 at Moscone Center in San Francisco, California. Look for the full program, which will be mailed in early June. ◧

Alan Tibbetts, Interex Vice Chairman and RTE old-timer

New Products

LAN Power Management

Network Security Systems, Inc. (NSSI) has announced LanSafe II for UNIX, a power management software package. The product is designed to bring to UNIX-based servers and workstations control of power conditions to avoid equipment damage data loss. LanSafe II for UNIX provides interactive management and control for all NSSI intelligent power systems throughout a network of workstations and servers. LanSafe II for UNIX incorporates an X-Window system and Motif graphical user interface.



LanSafe II for UNIX

Suggested U.S. list price of LanSafe II for UNIX is $149 for the single-seat version. The five-seat version is available at an introductory price of $299. This product is available immediately. For more information contact Network Security Systems Inc., 9401 Waples Street, San Diego, California 92121, ph: 619/587-7950 or 800/755-7078, fx: 619/552-9162.

Client Emulation

Puzzle Systems Corporation has added SoftNet Client to its SoftNet product line. The software is designed to allow HP 9000s to act as full Novell NetWare clients and to directly access Intel-based NetWare file servers. SoftNet Client does not require UNIX kernel reconfiguration or any disk partitioning. The workstation user can send print jobs to NetWare printers. NetWare 2.2 and 3.11 server types are currently supported, with later NetWare server types being supported as they are introduced. SoftNet Client began shipping as of March 1993. Pricing (U.S. list) has been established at $395 for a single-user license and $1,495 for a five-user license, regardless of UNIX platform type. Product is distributed worldwide through authorized resellers, distributors, and systems integrators. Contact Puzzle Systems at ph: 408/779-9909, fx: 408/779-5058, e-mail: jal@puzzle.com.

Load Balancer

Freedman Sharp and Associates, Inc. has announced Load Balancer Version 3.1, an automatic job queueing and load distribution facility for UNIX platforms. The product uses centralized configuration information about each application, computer, and user along with dynamically gathered performance information to run each application on the best-suited computer available.

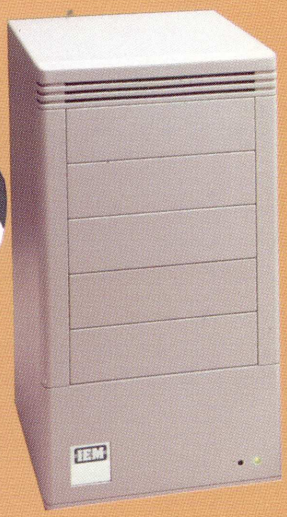
The central configuration file is designed to give the system administrator complete control over who can run what, where, and when. The software is designed to be transparent to users, require no application or kernel modifications, and to be reconfigured by the system administrator at any time without having to reboot or restart any daemons. The Load Balancer also includes a network-wide batch queueing system.

The Freedman Sharp Load Balancer is available for HP 9000s and other UNIX platforms. A Microsoft Windows front end was scheduled for release in April. Introductory pricing for a Load Balancer site license is $1,500 (U.S. list). Demonstration copies are available by contacting Freedman Sharp at ph: 403/251-2729, fx: 403/245-0036, e-mail: dan@newt.cuc.ab.ca.

Client-Server Accounting Products

Ross Systems, Inc. has announced Renaissance CS Series accounting

Cut costs, not corners — with riskless disks from IEM.







High capacity, high performance, high speed, high quality ...

... low cost.

IEM manufactures a wide variety of HP-IB and SCSI disk solutions that save dollars and make sense—the perfect fit for your data storage needs.

IEM

One Source, Many Solutions

IEM is the manufacturer of the largest line of HP third-party peripherals.

In the U.S. and Canada: **IEM, Inc.**, P.O. Box 1889
Fort Collins, CO 80522 USA
Phone: (1) 303-221-3005
(1) 800-321-4671
Fax: (1) 303-221-1909

In the United Kingdom: **IEM Europe**, Colorado House,
Cromwell Park, Banbury Road,
Chipping Norton, Oxfordshire. OX7 5SR.
Phone: +[44] 0608 645000
Fax: +[44] 0608 645155

All others: **IEM International Sales**
1629 Blue Spruce Drive
Fort Collins, CO 80524
Phone: (1) 303-221-3005
Fax: (1) 303-221-1909

©1993 Anis, Inc. D1.493

CIRCLE 21 ON READER CARD

products for open systems environments and client-server processing. The server component of the software is currently available for HP-UX. Ross Systems will also provide the applications for HP MPE/iX and other environments in the near future. The client component is scheduled for customer shipment in June 1993 and will support Windows 3.x, Macintosh, and Motif desktop environments. Renaissance CS Series is built with GEMBASE, Ross Systems' open fourth-generation language. The products are designed to take advantage of relational technologies and are currently available for Rdb and Ingres, with Oracle due to ship in June and Sybase later in 1993.

Ross Systems is also offering both PC (Windows 3.x) and Macintosh implementations with the same application features and with native look and feel for each graphical user interface. Renaissance CS also supports multiple desktop environments.

Renaissance CS Series includes multicurrency facilities and multilingual implementations, offering functions such as alternative forms of payments and different taxation requirements. Key components of Renaissance CS Series include General Ledger, Accounts Payable, Accounts Receivable, Purchase Order, Fixed Assets, Currency Management, Cost Allocations, Project Accounting, and Encumbrance. Contact Ross Systems, 555 Twin Dolphin Drive, Redwood City, CA 94065, ph: 415/593-2500, fx: 415/592-9364.

Document Imaging

HP and FileNet Corporation have signed a nonbinding letter of intent to port FileNet's document imaging and WorkFlo software products to HP's RISC-based HP 3000 and HP 9000 business systems and servers. FileNet's Image Management Services (IMS) Software is expected to be available on the HP computers by the end of 1993. As specified in the letter of intent, FileNet will market and support its software on the HP platforms. The software is a set of application modules that control the processing, storage, retrieval, and printing of document images. The porting is subject to the execution of a definitive agreement between the parties. Contact Robin Tanchum, FileNet Corporation, 714/966-3444.

HP to Bundle O'Reilly PEXlib Two-Volume Set

HP began bundling O'Reilly & Associates' PEXlib programming and reference manuals with PEX 5.1 early this year. The PEXlib Programming Manual by Tom Gaskins, a known figure in the international three-dimensional programming and graphics standards communities, and PEXlib Reference Manual offer comprehensive documentation and support for the first full-featured 3-D graphics application programming interface that is wholly native to the X Window System. Contact O'Reilly & Associates, Inc., 103 Morris Street, Suite A, Sebastopol, California 95472, ph: 800/338-6887, fx: 707/829-0104.

Enhanced Engineering Software

Cadshare Resources, Inc. has announced the release of DECADE-UX 2.02 for mechanical, GIS mapping, process design, or electrical engineering applications.

The new release accommodates keyboard and mouse entry.

DECADE-UX is priced at $995 and is currently supported on System 5 UNIX-based hardware platforms, including all RISC workstations. A C-based software package, DECADE-UX features a complete implementation of the OSF/Motif graphical user interface and X11 Windows technology. The software interfaces with Oracle, Informix, and ALLBASE/SQL databases and SmartCAM and Weber systems. Contact Cadshare Resources, Inc., 9303-N Monroe Road, P.O. Box 11859, Charlotte, North Carolina 28220-1859, ph: 800/633-7644, fx: 704/845-2659.

UNIX Connectivity via TCP/IP Support

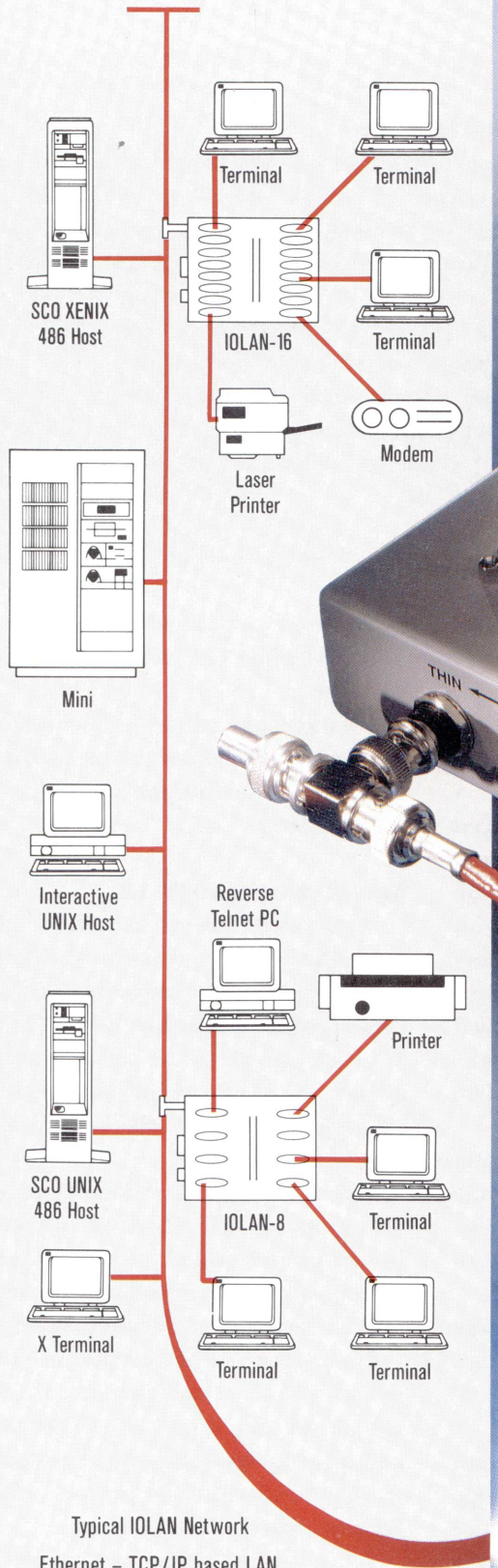
Systems Center, Inc. has announced NDM for UNIX, the newest extension to its Network DataMover (NDM) product line. Based on client-server architecture, the product is reportedly the first available to automate UNIX-to-MVS and UNIX-to-UNIX data transfer through support of the TCP/IP protocol. The product operates on popular UNIX platforms, including the HP 9000.

DataMover is designed to create an ongoing cycle of unattended operations, incorporating data transfers, business applications, batch jobs, and schedulers. NDM for UNIX allows application developers to control data transfer activities and provides a response mechanism that reports results to the application so it can take action. Rather than port an SNA product, NDM for UNIX is specifically designed to exploit the strengths of the UNIX environment, including native communications and command interface style.

NDM for UNIX requires NDM-MVS Release 7 to communicate with the MVS host.

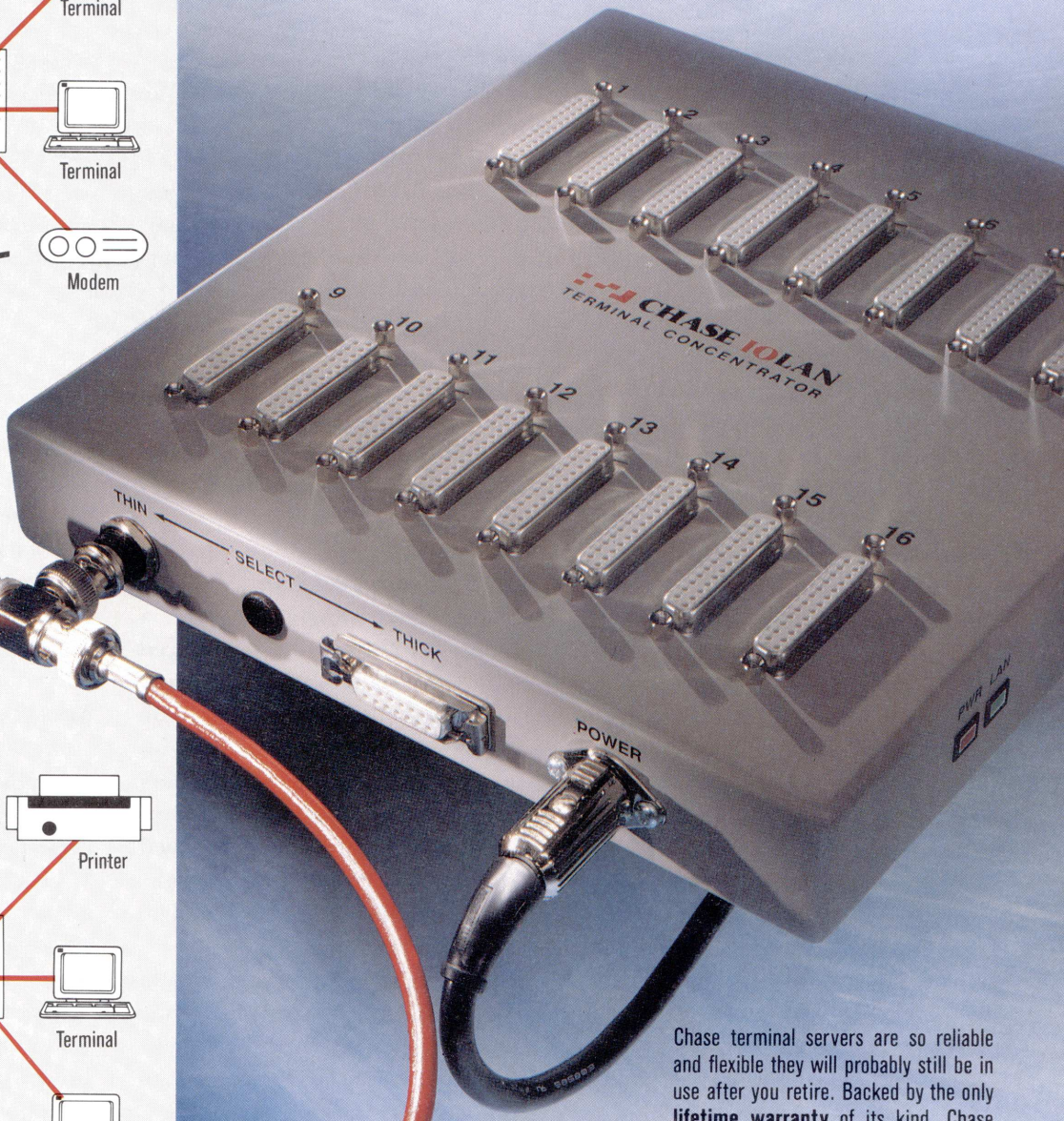
In North America, server pricing ranges from $1,500 to $18,000, depending on processor group. Client pricing is available from $375 to $4,500. For more information contact Systems Center, Inc., 1800 Alexander Bell Drive, Reston, Virginia 22091, ph: 703/264-8000.

Finally a terminal server that won't retire before you.



Typical IOLAN Network

Ethernet – TCP/IP based LAN.



Chase terminal servers are so reliable and flexible they will probably still be in use after you retire. Backed by the only **lifetime warranty** of its kind, Chase IOLAN is built to last *and* built to perform.

With IOLAN you can reliably add terminals, printers and modems to your TCP/IP networks. IOLAN simplifies cabling and adds flexibility to your open systems applications. By making IOLAN easy to use and accessible to PC users, Chase is now the *leading supplier of terminal servers* for the SCO and Interactive Unix marketplaces.

Only Chase offers you a unique menu interface, advanced networking statistics and Simple Network Management Protocol (SNMP) – all at a price you can afford.

As more and more users make their way to networking they also make their way to Chase. Discover Chase today by calling for a FREE COPY of our **'Terminal Server Application Guide'**.

CHASE RESEARCH

Connect with the future

Chase Research Inc.
545 Marriott Drive, Suite 100
Nashville TN 37210
615 872 0770
615 872 0771 (fax)

Chase Research PLC
Chineham Business Park
Basingstoke, Hants. RG24 0WD U.K.
(44) 256 52260
(44) 256 810159 (fax)

Chase Research GmbH
Zettachring 6
D-7000 Stuttgart 80, Germany
(49) 711 728 7155
(49) 711 728 7156 (fax)

Chase Research and Chase IOLAN are trademarks of Chase Research PLC. All other trademarks are acknowledged

CIRCLE 28 ON READER CARD

Expanded CDDI/FDDI Products

Crescendo Communications has announced 100 megabit-per-second (mbps) Copper Distributed Data Interface (CDDI)/Fiber Distributed Data Interface (FDDI) support in three additional computing environments. The new adapter drivers are said to bring five to ten times the performance of Ethernet and Token Ring to desktop users in Sun Solaris, HP, and Novell environments and provide the most comprehensive support on major desktop platforms.

Current product support includes Enhanced Industry Standard Architecture (EISA) platforms for PCs and servers running Microsoft LAN Manager stations. The HP-UX (Version 8.07) driver supports the HP/Apollo 700 Series via Crescendo's EISA adapter. The EISA CDDI adapter for HP has a single-quantity U.S. list price of $1,995. FDDI is available for $2,995. The EISA CDDI adapter for the PC NetWare has a single-quantity U.S. list of $995. FDDI is available for $2,395. Contact Crescendo Communications, 710 Lakeway, Suite 200, Sunnyvale, California 94086, 800/238-CDDI (2334).

LISP Development Tools

Franz, Inc. has begun shipping its Common LISP development tools for the HP/Apollo 9000 Series 700 workstations. The tools include Allegro CL 4.1, the Allegro Composer 2.0 development environment, and CLIM 1.1, the Common LISP Interface Manager.

Allegro CL 4.1 is a complete implementation of draft ANSI-standard Common LISP, supports advanced object-oriented programming. Allegro Composer 2.0 is an interactive development environment that includes class and process browsers, windowed debuggers, graphical profilers, an inspector, and a cross-referencer. CLIM 1.1 is a high-level set of facilities for building graphical user interfaces for LISP-based applications.

Contact Franz, Inc., 1995 University Ave., Berkeley, California 94704, ph: 510/548-3600, fx: 510/548-8253, or send to info@franz.com.

CASE Software Via Liken

Iconix Software Engineering, Inc., a developer of CASE software, announced that its entire product line of Iconix PowerTools will be immediately available to UNIX users within major aerospace and commercial firms via Liken software from Xcelerated Systems, Inc. (XSI). Consisting of 10 fully integrated modules, Iconix PowerTools are immediately available for use on HP 9000 Series 700 workstations.

The cost of an individual module can start at less than $1,000 when PowerTools and Liken are run together. Comparable UNIX-based products often cost a minimum of $8,000, the company notes.

For more information contact Iconix Software Engineering, Inc., 2800 28th Street, Suite 320, Santa Monica, California 90405, ph: 310/396-3454.

XSI also announced that a co-marketing agreement between Cambridge Scientific Computing, Inc. (CSC) and XSI will enable CSC to immediately provide the first-ever sales of CSC ChemDraw via XSI's Liken software to chemists who work on UNIX systems worldwide. CSC ChemDraw is the industry-standard chemical drawing program that has been available on the Macintosh since 1986. XSI will support CSC ChemDraw users on Liken.

For more information on ChemDraw, contact CSC, 875 Massachusetts Avenue, Cambridge, Massachusetts 02139, ph: 617/491-6892.

New Version of Liken 1.3

Xcelerated Systems, Inc. (XSI) has announced a new version of Liken Software. Liken 1.3 ensures 100 percent compatibility with Solaris 2.1 and HP-UX 9.01, popular e-mail packages such as Microsoft Mail, and On Technology's Meeting Maker group scheduling package for the Macintosh.

Liken allows UNIX workstation users to run off-the-shelf Macintosh applications without modification. It allows them to share files and databases, use software residing on Macintosh servers, and take advantage of cost-effective NFS-mounted storage, including disk drives, tape drives, disk arrays, and CD-ROM, and print to Apple Laserwriters, compatible PostScript laser printers, and Ethernet-based SPARCprinters.

A Liken single-user license costs $695. Contact Laura Jordan, Marketing Communications Manager, Xcelerated Systems, 9245 Sky Park Court, Suite 130, San Diego, California 92123, 619/576-3080; info@xsi.com.

Expansion Memory

Dataram Corporation has introduced a broad line of aggressively priced memory upgrades for HP 9000 Model 735/755 workstations. Dataram's new DR9755 memory boards, available in 16, 32, 64, and 128 MB capacitie's reportedly offer 20 percent savings over HP's expansion memory. The memory can be installed in any combination of 8-MB and 16-MB boards.

Dataram memory is priced from $1,420 to $17,920.

Contact Dataram Corporation, P.O. Box 7528, Princeton, New Jersey 08543-7528, ph: 609/799-0071, fx: 609/799-6734.

Interex Contributed Software Library Update

1993 HP-UX CSL Released by Interex

The 1993 Interex HP-UX CSL was released on June 1. The new release contains utilities and applications that have been created by experienced administrators to target the specific challenges HP-UX users face. This year's release contains 53 of the most current and effective programs, many of which come directly form Hewlett-Packard Labs.

The release features:

- **c-news**, the basic software needed to set up a server node to participate in USENET, a global electronic conferencing system.
- **wscrawl**, an X-window paint program that can be shared by a number of people at the same time. This is a great tool for collaborative work groups.
- **f2c**, a fortran to C translation tool. This program has many options to handle specific language constructs and will also produce both ANSI C and K&R style C.
- **tripwire**, a file integrity checker. This utility compares a designated set of files against information stored in a previously generated database.

HP-UX users who subscribe to Interex CSL-level membership automatically receive the annual release in addition to publications, conference discounts, and other benefits. Additional releases are available to CSL-level members for $400.

Call (800) Interex or (408) 747-0227 for more information.

INTEREX

The International Association of Hewlett-Packard Computer Users

Hewlett-Packard 9000 It's Our Specialty

80 Series
85A, B
86A, B
87A, XM

200 Series
9816A, S
9836A, C, CU
9837A
9920A, U

300 Series
310/320
330/360
350/370
318/319/340

We also carry memory and interface for all of our workstations.

Printers
2225A/B/C/D
3630A Paint Jet
2276A Desk Jet
2277A Desk Jet Plus
2278A Desk Writer
33440A, LaserJet II
33447A, LaserJet IID
33471A, LaserJet IIP
2684D Laser 2000
2562C 400 LPM Printer

Disc Drives
9121D
9122D
9133 drives
9134 drives
9153A/B/C
7957A
7958A
7963B

Plotters
7440A ColorPro
7470A 2-Pen
7550A Self-feed
7570A DraftPro
7575A DXL, 7576A EXL
7595A DraftMaster I
7596A, DraftMaster II
7580A,B
7585A, B
Electro Static Plotters
C1600A (D size)
C1601A (E size)

We offer large discounts, outstanding service and immediate delivery.

TED DASHER & ASSOCIATES
4117 Second Ave. S.
Birmingham, AL 35222
PH: 800-638-4833
FAX: 205-591-1108

CIRCLE 11 ON READER CARD

HEWLETT-PACKARD

TSA

The Right Equipment. Right Now.

BUY SELL RENT REPAIR

Memory
Plotters
Printers
Disc Drives
Workstations
Data Acquisition

9000
1000
3000
TEST

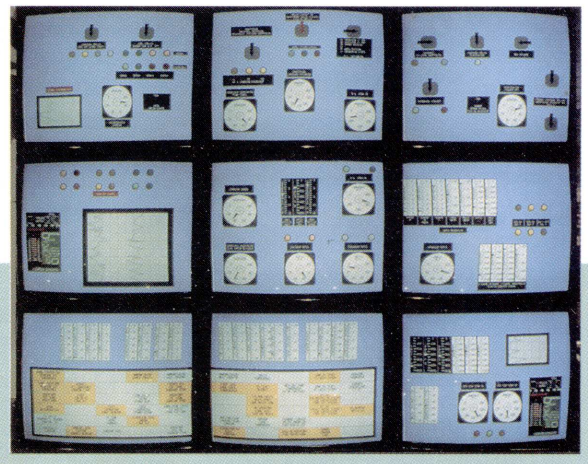
TECHNICAL & SCIENTIFIC APPLICATION INCORPORATED

2040 West Sam Houston Parkway N.
Houston, Texas 77043
Telephone 713 935-1500
Fax 713 935 1555

VISA
MasterCard

1 800 422 4872

CIRCLE 10 ON READER CARD



RGB Media Wall

New From RGB Spectrum

Video Windowing

RGB Spectrum has announced the RGB/View video windowing system, which provides real-time previewing capability and the ability to scale video images.

The RGB/View system accepts NTSC (or PAL) composite, Y/C (SVideo), as well as component RGB signals from any camera, tape recorder, live television, interactive video disc, or video teleconferencing system. X.TV software can manipulate the video window, adjust video parameters, control graphics overlays, select channels, adjust volume, and store video images for further processing. The real-time video signals are digitized and stored in a 24-bit video frame buffer and displayed as a scalable window on a workstation screen. Computer-generated graphics can be overlaid on the video window. The video frame buffer is directly accessible by the workstation.

Multiple Display System

The MediaWall multi-screen display system for control room and simulator applications is now available from RGB Spectrum. New for 1993 is an Ethernet link to virtually any workstation, including systems from HP.

MediaWall displays graphical or photographic information at very high resolution on a wall-sized array of monitors or projectors. Images are spread across multiple display devices under the control of a single computer.

Contact RGB Spectrum, 950 Marina Village Parkway, Alameda, California 94501, ph: 510/814-7000, fx: 510/814-7026.

Job Accounting

UniSolutions Associates has announced Version 2.1 of UNISOL JobAcct. Account budgeting is now available in addition to account billing. UNISOL JobAcct Version 2.1 also allows users to define their own default project, and the disk accounting can ignore NFS-mounted directories or perform accounting only for local file systems. Other enhancements include upgraded Motif and OpenLook user interfaces.

License fees for single machines range from $1,600 to $5,500. Contact UniSolutions Associates, 2103 Mathews Ave., Suite 1, Redondo Beach, California 90278, ph: 310/542-0068, fx: 310/370-4024.

Mass Storage Systems

R Squared has announced the Infinity IFS 700T and the Infinity IFS 9000T mass storage systems, said to represent the highest capacity mass storage solution compatible in the UNIX distributed computing environment. The products are compatible with HP 9000/700 workstations.

R Squared also announced that its Infinity IFS 10G, 20G, 60G, and 100G products are now compatible with HP 9000/700s. The products range from 10.4 GB to 93.6 GB of data storage capacity. R Squared was recently designated as an HP Original Equipment Manufacturer (OEM) for HP optical libraries.

Contact R Squared, 11211 East Arapahoe Road, Suite 200, Englewood, Colorado 80112, ph: 303/799-9292 or 800/777-3478, fx: 303/799-9297.

MS-Windows Applications to UNIX

MainSoft has introduced MainWin for porting MS-Windows applications to UNIX. Using the MainWin compatibility library and toolkit, software developers can convert any MS-Windows application written in portable ANSI C to a UNIX system supporting POSIX and X Windows. MainWin uses the MS-Windows application program interface (API) and the application is natively implemented on Xlib.

The first release of MainWin supports HP-UX 8.0 and other UNIX platforms. The MainWin Software Development Kit is priced at $5,000. Runtime licensing fees will be determined on a case-by-case basis.

Contact MainSoft Corporation, 185 Berry Street, Suite 5411, San Francisco, California 94107, ph: 800/MAINWIN (624-6946) or 415/896-0708, fx: 415/896-0709. In Europe: 13, Avenue Morane-Saulnier "Velizy Espace" 78140 Velizy, France, ph: 01133/134651819, fx: 01133/130706310.

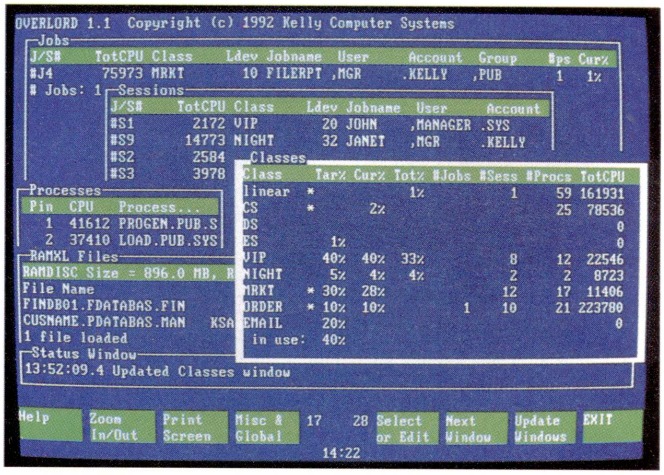
GUI for MAN-FACT II

Madic-Compufact Corporation, a Devers Group Company, has released a graphical user interface (GUI) for users of MAN-FACT II, their UNIX-based MRP II Enterprise Resources Planning System.

The GUI is based on the integration of standard industry tools with the application set for a GUI that provides mouse

How KELLY's Overlord™ controls HP 3000 performance problems in three easy steps.

Get Overlord from KELLY Computer Systems and leverage the extra productivity you need from your HP 3000 at a fraction of the cost of a total system upgrade. Overlord is a unique three-part product that tackles all the most prevalent obstacles to peak performance.



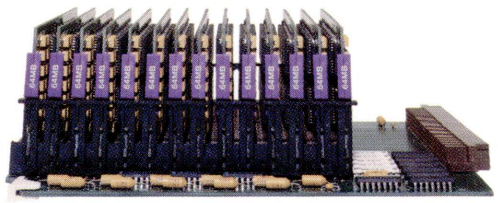
Fine-tuning is easy with Overlord's menu-driven user interface.

1 **Percentages**™ lets you control the percent of CPU resources available to each job, session or process. At the touch of a button, restrict "killer jobs" from bogging down the CPU, and make sure your top priorities get all the power they need. Overall productivity improves dramatically when you put first things first.

2 **Ramdisc**™ ends disk I/O bottlenecks by creating a solid-state "electronic disk" for heavily accessed files on the main memory bus. At the device level, memory access is about 30,000 times as fast as disk access; at the system level, performance gains of 30-70% are typical.

3 You can never have too much **KELLY memory**; in fact, the performance of your entire system is tied directly to main memory size. We design all our boards in-house using an advanced CAD system that guarantees unconditional enforcement of our conservative design rules. We build our boards in the USA using only HP-preferred parts, and then subject each finished board to a 100-hour intelligent burn-in on the HP system it's designed for. The end result of our meticulous attention to quality is a mean time between failures of over sixty years.

In ten years of exclusive focus on HP performance enhancement, KELLY has never had an unresolved support issue. Our Worldwide Customer Response Center is fully equipped with current hardware and software, and is staffed around the clock by HP-trained Customer and Systems Engineers. In addition to Overlord for the HP 3000, KELLY makes a complete line of memory and Ramdisc products for the HP 9000 Series 800 servers and Series 700, 400 and 300 workstations. For electronic forms users on LaserJet printers, our unique FormMaster cartridge slashes forms printing time by an average of 90%.



Only KELLY takes your 9x7 memory up to one gigabyte.

Call KELLY today and put Overlord to work for you. We have sales and support offices throughout North America and Europe.

For the KELLY location nearest you, contact our headquarters listed below:

KELLY Overlord Memory and Ramdisc Configurations

HP SPU	KELLY Array Size(s) (MB)	Maximum Memory w/KELLY (MB)	Maximum Ramdisc (MB)	Notes
99x	256	2048	1792	Call for availability.
9x7	128, 64, 32	1024	896	To exceed HP memory limit, models except 987 and 977 use KELLY 7-array extender card plus one array on backplane. 987 and 977 use KELLY 8-array extender card. All feature KELLY custom single-chip memory controller using 0.8-micron technology.
980	64, 16	1024	896	Online/offline switch; online and activity LED indicators.
95x, 960	16	256	192	Online/offline switch; online and activity LED indicators. KELLY maximum exceeds HP limit.
958, 948, 932 922, 920	32	384	320	KELLY custom single-chip memory controller uses 2.0-micron technology. KELLY maximum exceeds HP limit.
949, 935, 925	32, 16	224	160	

KELLY COMPUTER SYSTEMS

North American Headquarters

139 N. Whisman Rd.
Mountain View, CA 94043
USA
TEL: 415 - 960 - 1010
FAX: 415 - 960 - 3474

European Headquarters

Am Felde 2
D-22765 Hamburg
Germany
TEL: +49 40 391704
FAX: +49 40 391703

©1993 by KELLY Computer Systems, Mountain View, California. All rights reserved. Overlord, Percentages and Ramdisc are trademarks of KELLY Computer Systems. All other product names are trademarks or registered trademarks of their respective companies.

REV Ovd 6/93

CIRCLE 25 ON READER CARD

control, font selection, window sizing, user-defined widgets (such as icons and push buttons), cut-and-paste capabilities, and screen scrolling. The GUI is available for both Macintosh and Microsoft Windows-based clients connected to HP 9000 servers.

For more information contact Madic-Compufact Corporation, 7441 Lincoln Way, Suite 200, Garden Grove, California 92641, ph: 714/891-6336, fx: 714/897-7616.

Data Modeling Tool

The GE Advanced Concepts Center has announced the release of OMTool 1.2, an interactive, workstation-based data modeling tool available on HP 9000 Series 700/800 and other platforms. The updated tool supports graphical preparation and editing of object models for systems, programs, and databases using the Object Modeling Technique developed by General Electric scientists.

Contact GE Advanced Concepts Center at 800/GETRAIN (438-7246).

New from Cincom

Knowledge Specification/Generation

Cincom Systems, Inc. has announced the availability of XpertRule, a knowledge-based system for simplifying the transfer of complex logic and business rules for seamless integration into software applications. A methodology guide booklet is included.

The product is designed to allow automatic generation of MANTIS, the language of AD/Advantage. COBOL, C, or PASCAL code also can be generated.

New Licensing/Pricing for C:M

New licensing/pricing options for CONTROL:Manufacturing (C:M) include a usage-based licensing. The company can now offer a basic C:M system for about $100,000, with a typical configuration of modules at about $160,000 for 25 users. Cincom's new usage-level license option includes a base fee for each "functional component," allowing a user to determine which system module is to be implemented and license only what is needed and a fee for "usage," not directly related to the modules or platform, but to the number of concurrent system users. This part of the license is available in blocks of 25 or 100 users.

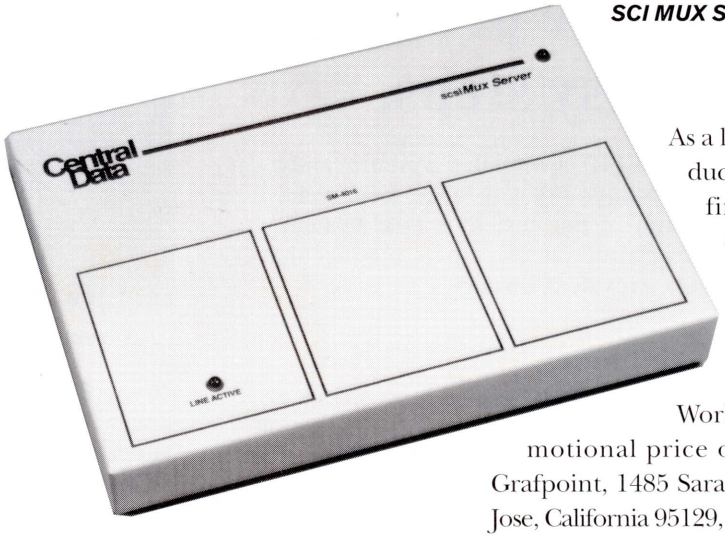
Contact Cincom Technologies at 800/543-3010, or contact your local Cincom sales office.

X for Workgroups

Grafpoint, Inc. has announced X for Workgroups, reportedly the first implementation of an X11 server designed specifically for the Windows for Workgroups environment. The product contains in one package all the software needed to access X Window applications on UNIX hosts. X for Workgroups is an X server program that allows PC users concurrent access to X Window applications on a host computer while running Windows for Workgroups locally.

The list price of the single-user package of X for Workgroups is $495. A five-user package is also available for $1,995.

SCI MUX Server



As a limited-time introductory offer, for the first three months or the first 10,000 copies sold, Grafpoint will sell a single-user version of X for Workgroups at a promotional price of $239. Contact Grafpoint, 1485 Saratoga Avenue, San Jose, California 95129, ph: 408/446-1919.

New From Vangard Technology

Mass Storage/Tape Library Systems

Vangard Technology, Inc. has introduced mass storage optical and tape library systems bundled with the HP 9000 Series 700 workstations. The products can be bundled with an HP workstation implementing FDDI, SCSI-I, or SCSI-II interfaces. These configurations include online, near-line, and archival mass storage solutions from 20, 60, or 100 GB optical jukebox technology to 11 terabytes of high-speed tape technology.

An Infinity port to the HP 9000 Series 800 will be complete in the second quarter of 1993. The newly released IFS-700T and IFS-9000T will also be compatible on the HP platform early in the second quarter.

Vangard and Nth Portable Graphics Agreement

Vangard also announced an agreement with Nth Portable Graphics to provide Silicon Graphics GL Libraries with the HP 9000 Series 700 workstations, so the HP end user can run software development environments or operate installations running existing SGI applications with Vangard and Nth Portable Graphics.

Interex on Internet

Interex has established connections to Internet, allowing for fast and easy e-mail exchange between Interex and its membership.
To send e-mail to Interex, use the following address format:

<IDname>@interex.org
example = Ehrhardt_Michael@interex.org

The following IDs are currently active on INTEREX's HP 9000:

ID	Department
postmaster	InterNet support
cslhpux	CSL/HP-UX
cslmpe	CSL/MPE
membership	Membership Services
pubs	Publications
conference	Conference arrangements

INTEREX

The International Association of Hewlett-Packard Computer Users

Consider the advantages of INTEREX's
Direct Mailing Services
in your future advertising campaigns

- 40,000 HEWLETT-PACKARD Computer Users
- Response rates up to 10 percent or higher
- A one-week turnaround time
- Less than 2 percent returns because of bad addresses
- Full refund for all nixes (bad addresses)
- 15 percent discount on all orders over 10,000 labels
- List updated daily
- 74 percent of our users are company Decision Makers

We can offer you the greatest value for your money with our:

1. **Direct Mailings**
2. **Card Decks (four times a year)**

Do you have NEW PRODUCTS you want to announce to the HP community?

The HIGHEST RESPONSE RATES for your new developments are almost always with Direct Mailings, or Card Decks.

We can mail your advertisement items from our designated mail house in California, or from a bonded mail house in your city.

Give us a call today; we'll get your important product message out to our 42,000 HP Computer Users, and YOUR REPLIES will start coming to you the following week.

For more information, contact Liway Gimenez, INTEREX, P.O. Box 3439, Sunnyvale, California 94088-3439 USA,
Phone (408) 747-0227, FAX (408) 747-0947.

Contact Vangard Technology, 11211 East Arapahoe Road, Suite 200, Englewood, Colorado 80112, ph: 303/790-6090, fx: 303/799-9297.

New from Central Data

scsiMUX Server

Central Data Corporation has announced the scsiMux Server, designed to add remote multiplexed serial channels to UNIX systems including HP 9000 Series 700s. Each scsiMux Server concentrates eight or 16 channels over a synchronous composite line.

The scsiMux Server is available as a stand-alone unit or as a module that fits inside Central Data's scsiComm Server. The U.S. list price for both versions is $3,995.

Drivers are being developed for HP 9000 Series 800 systems as well.

scsiComm Server

Central Data Corporation also announced the scsiComm Server for fast, enterprise-wide serial and parallel expansion of UNIX workstations and servers, including HP 9000 Series 700 workstations. Drivers are being developed for Series 800 systems.

The scsiComm Server plugs into the SCSI bus and provides easy access to modems, terminals, printers, and other serial/parallel devices. Prices range from $295 to $3,995 (U.S. list).

Contact Mark Decker at Central Data, 1602 Newton Drive, Champaign, Illinois 61821-1098, ph: 217/359-8010 or 800/482-0315, e-mail: info@cd.com.

Rules-based Publishing Software

DataBase Publishing Software, Inc. (DPS) has announced SmartLeaf/Expert Publisher document automation software, designed to capture and record the expertise of production personnel and to allow this expertise to be re-used at a significant time savings. Through the combination of a dynamic library and an intelligent production automation system, users can move data from information management systems to electronic publishing systems, as well as record, retrieve, and act on the rules that govern the creation of complex documents.

SmartLeaf/Expert Publisher is licensed on a server basis (1-4 servers) at a list price of $15,000. SmartLeaf products are available on HP/Apollo Series 400 and 700 workstations. SmartLeaf products also support the SQL, Informix, Ingres, Interbase, Oracle, Rdb/VMS, and Sybase databases. Contact DataBase Publishing Software, Inc., Suite 5300, 400 West Cummings Park, Woburn, Massachusetts 01801, ph: 617/938-0018.

Real-Time SPC System

Automated Technology Associates, Inc. (ATA) has announced the immediate availability of its RQM real-time quality management system on seven major platforms, including HP-UX. RQM is designed as a fully automated SPC system for monitoring and analyzing factory floor processes.

RQM's server license is $22,000 per CPU; user licenses are $1,700 per user, with multiple CPU discounts available. A client-server version is available.

Contact Automated Technology Associates, 8888 Keystone Crossing, Suite 600, Indianapolis, Indiana 46240, ph: 317/573-9000.

Security Management

DEMAX Software, Inc. has announced the release of SecureMax 3.1 for UNIX, security management software that adds the Motif graphical user interface (GUI) to the consolidated management console for Sun platforms, providing security information at a glance on HP, Sun, and other systems.

SecureMax features a software-based central security console for analysis, correction, and maintenance of security across the network. The SecureMax console is designed to produce a single report showing exactly which UNIX systems on the network fail to comply with corporate policy, and through the GUI, quickly attaches system managers to systems that present security risks. Contact DEMAX Software, 999 Baker Way, Suite 500, San Mateo, California 94404, ph: 415/341-9017 or 800/283-3629, fx: 415/341-5809.

Tape Backup Price Reduction

Conner Peripheral's Storage Systems Group, formerly Maynard Electronics, has announced price reductions of up to 15 percent on its Archive ST line of 1.35 GB quarter-inch tape backup systems for UNIX workstation or PC users. The company also recently reduced the price up to 13 percent on its Archive ST digital audio tape (DAT) backup systems.

Archive ST1350e (exernal drive) now costs $1,575. Archive ST1350i (internal drive) is now $1,675. Archive ST systems include common required installation hardware, including terminators, cabling, rails, jumpers, and media.

Conner has established a dedicated UNIX business support unit.

Contact Conner Peripheral's Storage Systems Group (formerly Maynard Electronics), 36 Skyline Drive, Lake Mary, Florida 32746, ph: 407/263-3500 or 800/821-8782, fx: 407/263-3555, e-mail: info@maynhbd.UUCP.



Need glasses?

Nope.
You need GENTRAN®

The complete Electronic Data Interchange system
for your HP 9000 and other UNIX platforms.

Call 1 800 879-3341 and we'll fax you more information.

STERLING SOFTWARE
ORDERNET Services Division

Sterling Software–The World's Largest EDI Solutions Provider.
EDI Software • EDI Network Services • EDI Education & Training

CIRCLE 16 ON READER CARD

OpenMail Licensing/Distribution Agreement

Applix, Inc. and HP have announced a distribution agreement naming Applix as a worldwide reseller of OpenMail, HP's open system electronic mail software product. Applix, scheduled to begin reselling OpenMail in the second quarter of 1993, is integrating the OpenMail product with Aster*x Mail, and Aster*x, an adaptive suite of applications and tools for UNIX workstations in client-server environments.

For more information on Applix products, contact the company at 112 Turnpike Road, Westboro, Massachusetts 01581, ph: 508/870-0300, fx: 508/366-9313.

SecurityAudit/UX

Vesoft has announced the availability of SecurityAudit/UX for HP-UX-based Series 700 and 800 platforms.

The new product is intended to allow system managers to quickly and easily monitor their HP-UX systems for security weaknesses and to aid in the closing of security loopholes. The product is based on Vesoft's experience as providers of security and auditing tools for the HP 3000.

The product is tailored to meet the needs of HP-UX systems and contains features specifically intended to address HP's PDF facility and ACL-based file security. Contact Vesoft, Inc., 1135 South Beverly Drive, Los Angeles, California 90035, ph: 310/282-0420, fx: 310/785-9566.

Desktop Window Manager

Nutec Corporation has announced Desktop Window Manager Release 2.30. Running on the UNIX host, Nutec Desktop is designed to turn the character terminal into a windowing terminal capable of displaying multiple applications concurrently. The windowing system offers an OSF/Motif look and feel and provides commands such as window resizing, movement, and iconization.

Contact Nutec Corporation, 2685 Marine Way, Suite 1319, Mountain View, California 94043, ph: 800/2NUTECW or 415/988-9781, fx: 415/988-9782, e-mail: sales@nutec.com.

Point of Sale System



POSLogic Corporation has announced the POSLogic 5000 Point of Sale System, reportedly the first UNIX-based point-of-sale system to incorporate both hardware and software as a fully integrated product. The setup process takes less than 30 minutes, the company notes.

Every POSLogic terminal comes with fully featured Point of Sale and Inventory Control software designed to operate under all popular varieties of UNIX, including HP-UX. The product is designed to help users intuitively perform cash sale, credit, refund, exchange, partial payment, store account, and other transactions. The system is designed to facilitate the sales cycle rather than just the transaction cycle.

The POSLogic 5000 system starts at $3,195. POSLogic will be selling its products through major national and regional UNIX distributors. Contact POSLogic, 2181 NW 99 Avenue, Pembroke Pines, Florida 33024, ph: 305/433-5310 or 800/929-5497, fx: 305/433-1062.

New From BBN

BBN-ICC Agreement

BBN Software Products, a division of the Cambridge-based Bolt Beranek, and Newman Inc., and Industrial Computer Corporation (ICC) of Atlanta, Georgia, have signed a systems integrator agreement. The agreement provides for development of a seamless link between BBN's RS/Series technical data analysis and graphics software and ICC's Shop Floor Data Manager (SFDM). The integration of these products is designed to offer manufacturers running on HP 9000 computers a comprehensive SPC/SQC solution that combines immediate access to shop floor data and full control-charting and statistical analysis capability.

Both companies are HP Premier Solution Providers.

Client-Server Data Analysis

BBN Software Products has announced BBN/Cornerstone, the first data analysis software designed for client-server computing. BBN/Cornerstone software consists of a base module that provides the data analysis framework, broad data access capability, graphics, and work session capturing. "Off-the-shelf" data analysis modules and Cornerstone Extension Language can be added to create an integrated, customized toolset.



Win the Battle to Cut Your Workload

Save time and thousands of dollars with a full arsenal of software solutions.

Put a battalion of programs developed by HP users for HP users—the INTEREX Contributed Software Library (CSL)—on your side. The CSL has thousands of programs ranging from full-screen editing for boosting everyday productivity to speedy disaster recovery routines.

CSL solutions can shrink your workload, save time and lower costs because they come from experienced HP users with an insider's understanding of your concerns. Just consider a few of the CSL benefits for your MPE, RTE or HP-UX operating system:

Spend less than $500 for a full set of solutions—For a small fraction of the cost of comparable software, you get the power to address everything from data communications to security more quickly, easily and inexpensively.

Eliminate time-consuming shopping and evaluation—Only the best solutions make it into the CSL, and they've already been tested, debugged, and fully documented.

Get hot-line support at no extra charge—We'll give you prompt, practical advice on using the CSL to your greatest advantage. Like the CSL, the hot-line is part of the full complement of INTEREX HP user support services.

It's easy to make the current CSL release your ally—Call Member Services Department at the 800 number below for a free MPE demo disk or a list of RTE, HP-UX and MPE CSL programs. You'll emerge a clear victor in the workload war.

(800) INTEREX

INTEREX
P.O. Box 3439,
Sunnyvale, CA 94088-3439

INTEREX is the International Association of Hewlett-Packard Computer Users.

CIRCLE 41 ON READER CARD

Base modules for BBN/Cornerstone run under HP-UX and other systems. List prices for BBN/Cornerstone client software start at $1,795 for a single-user fixed license and $2,395 for a single-user floating license. Distributed database access servers may be purchased separately. BBN has scheduled product availability for May.

Contact BBN, 150 Cambridge Park Drive, Cambridge, Massachusetts 02140, ph: 617/873-5000.

New from UniPress

PC Connectivity Software

UniPress Software, Inc. has announced availability of PC2X, designed to allow UNIX users control of remote PCs from an X window on a UNIX workstation or X terminal. PC2X runs over TCP/IP connections, RS-232-C serial lines, and supports most network interface cards. In addition PC2X supports CGA, EGA, and VGA color, text, and graphics. It is compatible with Windows running in real, standard, and enhanced modes.

A PC2X Starter Pack includes one PC server side and one UNIX client side, and is priced at $695. One-, five-, and ten-user PC add-on packs are available at $295, $995, and $1,695, respectively. Additional UNIX add-ons are priced at $495. Quantity discounts and site licenses are available.

PC Access to UNIX Mail

UniPress Software Inc. has also announced the immediate availability of Mail-it, an MS-Windows application designed to allow PC access to UNIX mail systems without expensive and complicated gateway products. Mail-it can be used to deliver messages to any Internet, USENET, or UUCP mailboxes, the company notes. Mail-it is priced at $140 per user for a five-pack and $115 per user for a 10-pack. Quantity discounts and site licenses are available.

Contact UniPress Software, 2025 Lincoln Highway, Edison, New Jersey 08817, ph: 908/287-2100, fx: 908/287-4929.

Wind River Systems and CenterLine Agreement

Wind River Systems and CenterLine Software (formerly Saber Software) have announced an OEM and integration agreement to provide real-time and embedded developers with a complete C++ development environment.

CenterLine's ObjectCenter C++ 2.0 programming environment supports all day-to-day activities of UNIX C++ and C software engineers and development teams including prototyping, design, coding, testing, deployment, and maintenance. Wind River's VxWorks and MicroWorks cross-development packages each provide a suite of design, testing, and debugging tools in addition to a micro kernel real-time operating system. Using ObjectCenter 2.0 with Wind River's cross-development packages is intended to provide developers with seamless access to all the tools they need to develop real-time embedded applications in C++.

Wind River scheduled product shipment beginning in June. The integrated ObjectCenter package costs $4,990 per license. The price for WindC++ an entry-level option is $2,495 for a single-user license, and the integrated CodeCenter package costs $3,990 per license. All products are available on HP/Apollo 9000 Series 700 workstations.

Contact CenterLine Software, Inc., 10 Fawcett Street, Cambridge, Massachusetts 02138-1110, ph: 617/498-3000, fx: 617/868-6655.

Test Recording Software

Mercury Interactive Corporation has announced XRunner Release 2.0, an automated, object-oriented software testing system designed to allow software developers to create tests that automatically adapt to changes in GUI-based applications. The new technology is also available in Mercury's recently introduced WinRunner software testing system.

XRunner 2.0 for UNIX/X and WinRunner for MS Windows, both providing object-oriented test recording, were scheduled for availability in April 1993. XRunner prices start at $10,000 per floating license in the base package configuration; the equivalent WinRunner pricing starts at $5,000. Contact Mercury Interactive Corporation, 3333 Octavius Drive, Santa Clara, California 95054, ph: 408/987-0100.

New From TeamOne Systems

Build Utility

TeamOne Systems, Inc. has introduced TeamMake, a new utility in its TeamTools product family. TeamMake is a distributed "make" compatible software build tool designed to provide significant performance advantages over other available tools and is integrated with the TeamNet concurrent development environment.

TeamMake is based upon GNU Make and Customs technology. It is reported as the only "make" utility to provide distributed multi-platform concurrent build capability. The product supports distributed concurrent builds to any NFS client platform within the network.

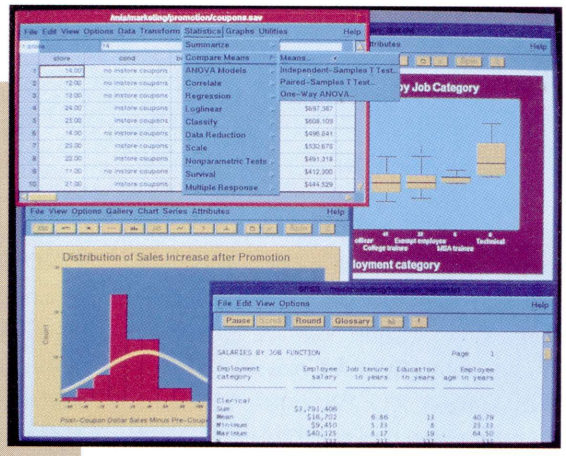
Stat Software

SPSS Inc. has announced a new UNIX version of its SPSS statistical software with a Motif user interface and integrated capabilities for data access, analysis, graphics, and reporting. SPSS scheduled product availability on HP 9000 Series 700s for mid-year.

SPSS for UNIX consists of a base system and add-on modules that include Professional Statistics, Advanced Statistics, Tables, Categories, and SPSS Trends. Another module, LISREL 7, will be available later this year. In this initial release, the base, Professional Statistics, and Advanced Statistics will feature the Motif interface. GUI versions for most options will be provided later in the year.

SPSS offers flexible licensing options and modular packaging. The product runs on UNIX-based computers or compatible workstations and on graphical X-Stations (for GUI) or character-based terminals previously supported under SPSS 4.0. For GUI, the product requires Motif 1.1 or above.

All licensed users of SPSS for UNIX are entitled to technical support via fax and telephone. Contact SPSS, 444 North Michigan Avenue, Chicago, Illinois 60611, ph: 800/543-9262.



SPSS for UNIX

Real-Time Graphical Interface

TeamOne Systems, Inc. has announced TeamView, a real-time graphical interface that allows users to create a pictorial representation of product data at a system level.

TeamView is immediately available in a TeamTools package that includes TeamNet and TeamMake. The new TeamTools package is priced at $16,250 for a system that supports up to five people. Volume discounts are available. All customers with current maintenance contracts will be upgraded to the full TeamTools package.

Contact TeamOne, 710 Lakeway Drive, Sunnyvale, California 94086, ph: 408/730-3500.

Free Memory Board Selector Guide

Martech, a manufacturer of HP/Apollo-compatible memory boards, is offering a Selector guide to help users instantly select the right memory board for their computer or workstation, at a cost savings ranging from 34 to 73 percent. The Guide lists over 100 memory upgrades, including boards for workstations and co-processors. Martech notes that all memory boards are built to meet or exceed HP standards, using the same high-quality components as HP.

To get your free Memory Selector Guide, contact Martech, 1151 West Valley Blvd., Alhambra, California 91803, ph: 800/582-3555 or 818/281-3555, fx: 818/284-3092.

Document Imaging Interface

Information Builders has announced FOCUS document imaging interface to access Wang Laboratories, Inc.'s OPEN/Image for HP-UX software.

The software is designed to allow new and existing FOCUS for HP-UX applications to integrate images in any functional area of the application. FOCUS is reportedly the first fourth-generation language (4GL) to take advantage of Wang's OPEN/Image for HP-UX software. FOCUS for HP-UX and OPEN/Image for HP-UX run on HP 9000 Series 700 and 800 processors.

The product is immediately available and ranges in price from $400 to $16,055, depending on configuration. Contact Information Builders, Inc., 1250 Broadway, New York, New York 10001-3782, ph: 212/736-4433, fx: 212/967-6406.

Mac and Workstation Interoperability

Helios USA and Xcelerated Systems, Inc. (XSI) have announced 100 percent compatibility between the Helios EtherShare 2.2 products and XSI's Liken. Liken emulates the Macintosh environment on UNIX; together, EtherShare and Liken are designed to provide complete data integrity between UNIX workstations and associated Macintosh and PC users. They also provide UNIX users with a comprehensive set of AppleTalk network services. An EtherShare server system, which can service up to 245 concurrent connections, begins at $4,990; a single-user license for Liken is priced at $695.

Contact Xcelerated Systems, 9245 Sky Park Court, Suite 130, San Diego, California 92123, ph: 619/576-3080, fx: 619/576-2504, e-mail: liken@xsi.com.

CorVision Ported to the HP-UX

CORTEX Corporation and HP have announced a joint marketing and development agreement. CORTEX will port its application development tool, CorVision, to HP-UX and will encapsulate CorVision so that it runs with HP's SoftBench Framework. This new product is designed to allow users to develop CorVision applications using HP-UX on the 9000 Series 800 server.

As part of the marketing agreement, CORTEX will become an HP Channel

Partner. CORTEX and HP are expected to develop a set of joint marketing programs.

Contact CORTEX Corporation, 100 Fifth Avenue, P.O. Box 9097, Waltham, Massachusetts 02254-9097, ph: 617/622-1900, fx: 617/622-1934.

ClockWise Scheduling Software

PhaseII Software Corporation has announced the release of ClockWise 2.0 for DOS LANs, designed to operate stand-alone on a DOS LAN or as a client to a ClockWise system on UNIX using PC/NFS, Novell Netware, or similar networking software. ClockWise starts with many of the features of personal information managers such as calendars, notes, to-do lists, and address books, but then extends them to a group of people.

ClockWise 2.0 runs on HP-UX and other UNIX platforms. The basic client-server package, including the software for connecting with a ClockWise system running on a UNIX, host is priced at $295 for a five-client system. Additional client licenses may be purchased for $249 per five-client package. There is no additional charge for adding resource calendars or user calendars to the system. A Personal Edition of ClockWise, available for the single user, is priced at $99. Contact PhaseII Software, 444 Washington Street, Suite 407, Woburn, Massachusetts 01801, ph: 617/937-0256.

New from Sterling Software

EDI Management/Translation

Sterling Software, Inc. has announced that GENTRAN for UNIX, EDI management and translation software, is now available for the HP 9000. Sterling has also been designated an HP Channel Partner for marketing of GENTRAN for UNIX to HP users. A series of seminars is scheduled by Sterling and HP at HP sales offices throughout the country. The seminar will cover the overall business and technology requirements for implementing an EDI system on the HP 9000. More information and reservations may be obtained by dialing 614/793-7128.

X.400 Capability

Sterling Software also announced full X.400 connectivity in their Electronic Commerce value-added network (VAN). Electronic Commerce is defined as "doing business electronically" and encompasses network services, enabling software, value-added applications, and professional services. Sterling's X.400 service is designed to seamlessly forward both text and data messages to other public and private networks.

For EDI traffic, an EDI gateway will connect non-X.400 trading partners to X.400-capable trading partners. All Sterling network services for EDI will be supported on the new standard, including EDI/LaserMail, Carbon Copy, EDI/Fax.

Contact Sterling Software, 4600 Lakehurst Court, P.O. Box 7160, Dublin, Ohio 43017-0760, ph: 614/793-7000.

Insignia and Bristol Agreement

Insignia Solutions, Inc. and Bristol Technology have designed an agreement to jointly develop products to allow Windows applications to run on UNIX desktops.

Insignia Solutions provides PC emulation for UNIX-based workstations and Macintoshes. Bristol Technology is a software development firm committed to bringing Windows applications to X and Motif.

Contact Insignia Solutions, Inc., 526 Clyde Avenue, Mountain View, California 94043, ph: 415/964-7600, fx: 415/964-5434.

Accounting, Human Resources

SOTAS International, Inc. has announced that its "Accountable Solutions" accounting and human resources solutions now run on HP-UX systems.

SOTAS International's "Accountable Solutions" product line includes General Ledger and Financial Reporting, Accounts Payable, Purchase Order and Receiving, Inventory Management, Accounts Receivable, Fixed Assets Management and Property Control, Human Resources, COBRA Management, and Applicant Recruitment Tracking. SOTAS' user-based pricing ranges from $8,000 to $80,000 per module.

SOTAS customers are automatically enrolled in the Total Investment Protection Service (TIPS) program for complete investment protection. Contact SOTAS International, 192 Merrimack Street, Haverhill, Massachusetts 01830, ph: 508/372-0770.

TCP/IP Resources Control

Holland House has released Vantage 1.03, designed to allow control of networked resources incorporating various TCP/IP services. Vantage can now access any resource that supports HP's vt3k NS/Service, telnet, or rlogon. In addition, Emulex TCP/IP terminal servers have been qualified with Vantage and provide secured serial console links to connect, automate, and centralize control of remote computers systems, LAN bridges, hubs, and other resources with RS-232 console or management ports. Enhancements to the product include a Non Event Display (NED) window and an application programmer interface

(API). NED is designed to allow display of only unexpected messages. The API allows user-supplied programs and scripts to be executed on the Vantage workstation in response to detected events.

Vantage polyConsole software operates on HP 9000 Series 700 workstations under the Visual User Environment and displays an operator's "window" for each monitored resource. Nearly any RS-232 serial interface may be controlled through Vantage. Vantage is currently qualified for HP 1000s, HP 3000s, and HP 9000s.

Contact Holland House, P.O. Box 91027, Austin, Texas, ph: 512/288-7540, fx: 512/288-4240.

Virtual Disk, Shadowing

Bear Computer Systems has announced HP-UX/Magic Disk, a virtual disk and shadowing package for the HP 9000. HP-UX/MagicDisk is designed to allow disk division into sections that look like separate disks to the operating system and creation of a fast, temporary software-based disk from either physical or paging memory.

HP-UX/MagicDisk is also designed to provide data fault tolerance and improve read performance. The product works with all user applications for HP-UX.

Contact Bear Computer Systems, Inc., 9584 Topanga Canyon Blvd., Chatsworth, California 91311, ph: 800/255-0662 or 818/341-0403, fx: 818/341-1831.

New from HP

IDE Agreement

HP has announced that Interactive Development Environments (IDE) has been selected as a member of the Premier SoftBench Channel Partner Program for strategic ISVs. IDE also announced immediate availability of a version of its C++ Development Environment integrated with HP's C++ SoftBench, and a version of its Ada Development Environment integrated with HP's SoftBench and the Ada/SoftBench product from Alsys, Inc. IDE also announced that the two companies are working together to significantly enhance the integration of its C Development Environment into the SoftBench Framework.

IDE offers comprehensive language-specific development environments for C, C++, and Ada that integrate analysis, design, reuse, construction, testing, requirements traceability, configuration management, and documentation tools for their respective languages. IDE's C Development Environment adds reverse engineering and incremental synchronization capabilities. The company is shipping a version of the C++ Development Environment and the Ada Development Environment integrated with SoftBench program construction tools, HP's C++ SoftBench, and the Ada/SoftBench product from Alsys, Inc. The integration is included in the product prices, which for single licenses are $11,500 for Ada and $10,000 for C++. IDE and HP expect to complete the integration of the C Development Environment with SoftBench construction tools, including incremental forward and reverse engineering capabilities as well as the synchronization facility, in the second quarter of 1993.

HP's Premier SoftBench Channel Partner Program recognizes products and vendors that provide leading solutions for customers with the SoftBench Framework. The Premier label indicates that the product is integrated to the CASE Communique standard or better and is integrated on multiple platforms. It also indicates that the company is helping drive the standards for providing control integration for their products through CASE Communique.

Protocol and Conformance Testers

Hewlett-Packard has introduced HP remote manager, a workstation-based, remote-control software utility for the HP PT family of protocol and conformance testers. This application combines the power of the UNIX operating system and the HP 9000 Series 700 workstation to provide protocol-tester management and coordination from a central location.

The HP PT protocol testers are used widely in the communications industry to certify conformance to international data communcations standards and verify correct device and network behavior. Targeted for R&D engineers, network operators and the conformance-test community, the HP PT family supports a full complement of protocol conformance-test suites, and a complete list of protocol monitor and emulation applications.

HP remote manager development libraries also are available, which provide a programmatic interface to the remote-tester facilities. These C-language libraries can be used to perform the remote control of the testers from a customized environment. In this manner, a translation mechanism or proxy may interface directly with the remote testers.

HP scheduled availability of the product for July 1993 and priced it at approximately $1,000 for an initial copy. The development libraries are expected to be approximately $22,000 per copy. ◧

By joining Interex, you'll profit from the skills and experience of talented HP-UX users. *By joining now,* you can take advantage of two of our strongest HP-UX support services: *hp-ux/usr* magazine and the Interex '93 Conference & Expo!

Join Interex and get *hp-ux/usr* free.

INTEREX

Support services you can count on.

Interex, The International Association of Hewlett-Packard Computer Users

1. YES! I WANT TO JOIN INTEREX.

Name _____

Title _____

Company _____

Address _____

City _____ State/Province _____

Country _____ Postal Code _____

Telephone () _____ Ext. _____

Fax () _____ E-mail Address: _____

Are you currently a member of an HP user group? ☐ Yes ☐ No

Group Name _____

COMPLETE ONLY IF "BILL TO" ADDRESS IS DIFFERENT:

Name _____

Title _____

Company _____

Address _____

City _____ State/Province _____

Country _____ Postal Code _____

Telephone () _____ Ext. _____

Fax () _____ E-mail Address: _____

Benefits of Membership:

GENERAL

- $200 Discount on Interex Conferences
- *hp-ux/usr,* a bimonthly HP-UX technical magazine
- *Interact,* a monthly MPE technical magazine
- *Real-Time Interface,* a quarterly for RTE users
- *INTEREX Press,* a monthly news publication
- Access to Regional User Groups
- Membership in Special Interest Groups (SIGs)
- Bulletin Board Service (BBS)
- Vendor Service Source Product Directory
- Voting privileges
- An advocacy channel directly to HP
- Online access to MPE and HP-UX CSL indices
- Option to upgrade to CSL level membership

Note: The General Membership does NOT *include the Contributed Software Library.*

CSL/SITE

Includes all of the above, plus:

- Annual Contributed Software Library (CSL) Release
- Option to purchase Swap Tapes and past releases
- Online access to CSL Index
- Hotline support for CSL at no extra charge

VOLUNTEER OPPORTUNITIES:

☐ Yes, I'd like to help. Please send information.

SPECIAL INTEREST GROUPS:

☐ Please send a list of SIGs affiliated with Interex.

Interex Membership Offering

Join Interex for $95 and get **$200 off** your registration fee for the Interex '93 Conference & Expo! (September 19–23, at Moscone Center, San Francisco, California)

2. THE SERVICE LEVEL THAT BEST MEETS MY NEEDS IS:

☐ **Sign me up for a General Membership**
$95* Annual Fee

☐ **Sign me up for a CSL/Site Membership**
$495* Annual Fee

☐ **Outside of USA, add $50 for shipping charges.*

usr1

SELECT OPERATING SYSTEM FOR CSL TAPE:
(ONE TAPE IS INCLUDED WITH CSL/SITE MEMBERSHIP, ADDITIONAL TAPES ARE AVAILABLE FOR $400 EACH)

☐ HP-UX ☐ MPE V ☐ MPE XL (iX) ☐ RTE

SELECT SOFTWARE FORMAT FOR CSL TAPE: (CHECK ONE)

☐ 1600 BPI magnetic tape ☐ 6250 BPI magnetic tape
☐ Linus cartridge tape (CS-80) ☐ DAT 4mm (Digital Audio Tape)

PLEASE READ AND SIGN THE FOLLOWING DISCLAIMER:
I am applying for services with Interex. I understand that no funds will be returned after any Contributed Software Library tapes/disks have been shipped from Interex. I agree not to distribute software to any unauthorized users or use software received through Interex on more than one system at a time. I understand that this agreement stays in force even after my services expire or are terminated.

Signature _____ Date _____

3. COMPUTERS AT SITE (ENTER NUMBER OF COMPUTERS AT YOUR SITE):

HP 3000
Series 9XX, no. at site _____
Classic, no. at site _____

HP 9000
Series 8XX, no. at site _____

HP 1000
Series 9XX, no. at site _____

WORKSTATIONS
HP Series 700, no. at site _____
HP Series 400/300/200, no. at site _____
Apollo/Domain, no. at site _____
Sun, no. at site _____
Dec, no. at site _____
Other, no. at site _____

4. SEND THIS PAGE WITH PAYMENT TO:

Interex, Dept. 1530, P.O. Box 61000, San Francisco, CA 94161, U.S.A.

OR MAIL/FAX THIS PAGE WITH CREDIT CARD INFO TO:
Interex, Acct. Dept., P.O. Box 3439, Sunnyvale, CA, 94088-3439, U.S.A.
FAX (408) 747-0947 Phone (408) 747-0227 or (800) Interex (U.S. and Canada only).

5. PAYMENT OPTIONS:

(U.S. currency) **Total** $_____

☐ Check enclosed payable to Interex
☐ Bill me**
☐ P.O. enclosed, # _____, please invoice.**
☐ Please charge my: ☐ VISA ☐ MasterCard ☐ American Express
Account No. _____

Signature _____ Exp Date ____/____

***Service begins when payment is received.*

6. SERVICE AGREEMENT:

If you relocate, should the membership transfer with you?
☐ Yes ☐ No Initial _____

We provide blind mailing of computer-related materials for vendors.
Would you like to receive these mailings? ☐ Yes ☐ No

Rev.6/93



Why pay more?

Now you can add workstations to your Domain/OS or HP-UX environment at only a fraction of the list price.

That's what remanufacturing is all about. Recent model, lower cost equipment that runs like new because it has been rebuilt. From the ground up. To manufacturer's specifications.

Literally manufactured a second time. By **Tryonics**, the people who know how to optimize these systems for your installation—new or existing.

Tryonics delivers the highest quality remanufactured workstations on the market today. Backed with technical expertise, full 90-day warranty and eligible for manufacturer's maintenance contract.

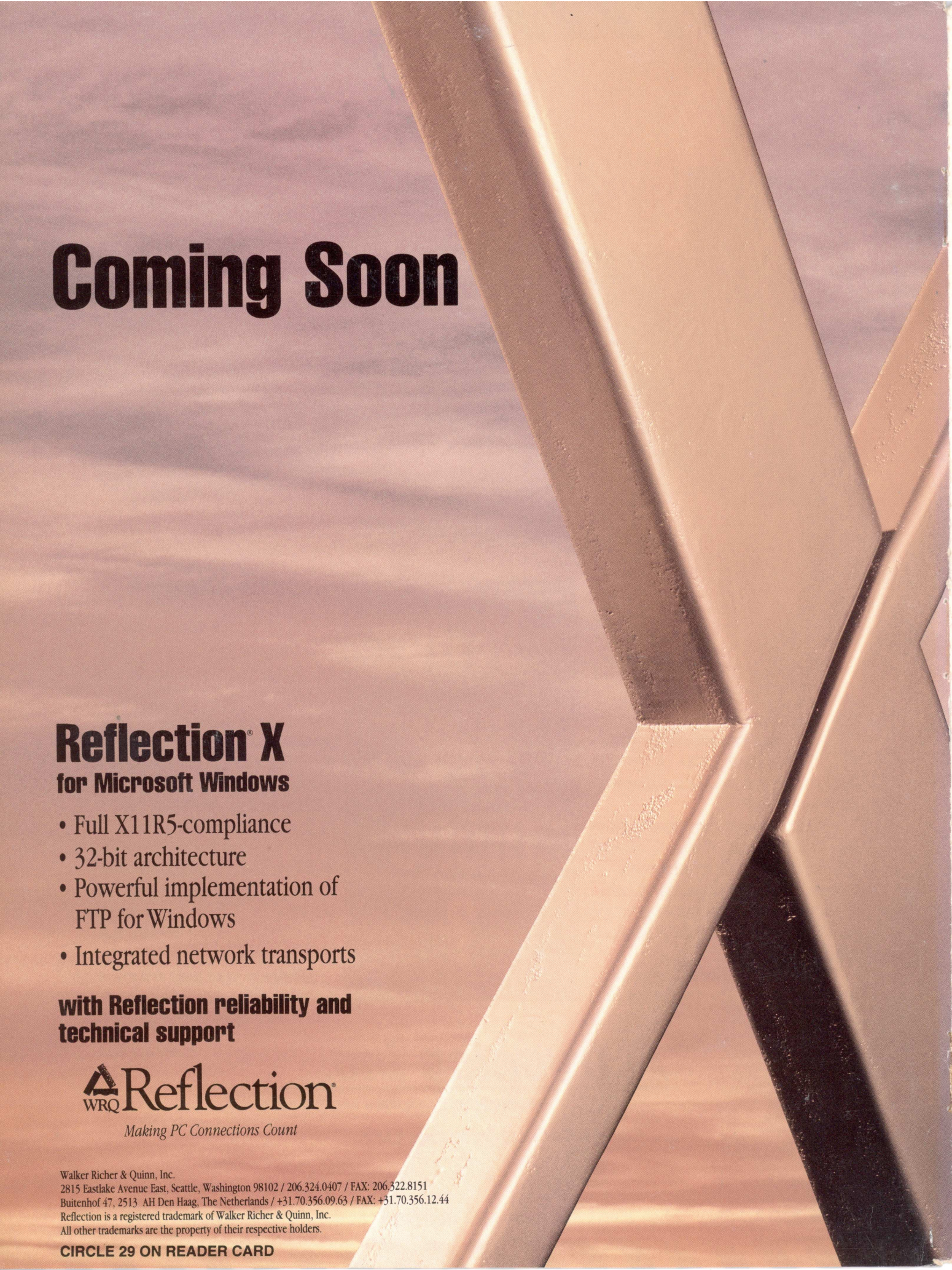
Before you pay more, call **1-800 551-6236**

tryonics inc.

Workstation Computers and Services

CIRCLE 23 ON READER CARD

Fax (603) 427-6843 Email: info@tryonics.com 170 West Road Suite #15 Portsmouth, NH 03801


Coming Soon
Reflection® X
for Microsoft Windows
• Full X11R5-compliance
• 32-bit architecture
• Powerful implementation of FTP for Windows
• Integrated network transports
with Reflection reliability and technical support
WRQ Reflection
Making PC Connections Count
Walker Richer & Quinn, Inc.
2815 Eastlake Avenue East, Seattle, Washington 98102 / 206.324.0407 / FAX: 206.322.8151
Buitenhof 47, 2513 AH Den Haag, The Netherlands / +31.70.356.09.63 / FAX: +31.70.356.12.44
Reflection is a registered trademark of Walker Richer & Quinn, Inc.
All other trademarks are the property of their respective holders.
CIRCLE 29 ON READER CARD